The Engineering and Mining Journal

WITH WHICH IS CONSOLIDATED "MINING AND METALLURGY."

VOL. LXXVI. NEW YORK, SATURDAY, JULY 11, 1903. No. 2.

THE ENGINEERING AND MINING JOURNAL
AND MINING AND METALLURGY — ESTABLISHED 1866

PUBLISHED EVERY SATURDAY.

261 BROADWAY, NEW YORK.

TELEPHONE 6866 CORTLANDT. P. O. BOX, 1833

CABLE ADDRESS "ENGMINJOUR" NEW YORK.

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Entered at New York Post Office as Second Class matter.

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THE INDEX to Volume LXXV of the ENGINEERING AND MINING JOURNAL accompanies this number of the paper. Subscribers who do not receive it are requested to notify us immediately, so that a copy may be sent to them. The present Index is the largest yet compiled, comprising nearly 12,000 titles and over 35,000 page references; it shows the progress that has been made in the mineral industry during the past half-year. A glance at the Index suggests the large number of valuable contributions published during this period, particularly on ore deposits, on the sampling and valuation of mines, on the problem of secondary enrichment, on electricity in mining, on copper smelting, and other subjects which have created much intelligent discussion. Moreover, this elaborate Index characterizes the rapid and substantial development of the ENGINEERING AND MINING JOURNAL in the past thirty-seven and one-half years. It shows also the wide range of subjects covered in the course of a half-year.

IN THIS ISSUE we publish an article on mine accounts by our London correspondent, together with some timely comment from Mr. H. C. Hoover, of the firm of Bewick, Moreing & Company. The question is not the system of book-keeping, for that can be left to any reasonably good management, but the allocation and distribution of accounts under the respective headings, so that comparisons can be made advantageously. The obscuring of working costs by manipulation between capital and revenue accounts is a fruitful source of grave misunderstanding. Fictitiously low costs are frequently palmed off in order to increase apparent profits, and the honest inclusion of all the items of expense will sometimes take from a careful manager the credit which he deserves. Mr. Hoover's plea for a common basis of comparison is well taken. He backs it with the promise that the twenty mines, whose operations are directed by his firm, would adopt an agreement whereby such a result could be attained. We commend the subject to experienced mine managers and invite their views upon it.

⚒

THE LABOR situation is improving. In New York the exposure of corruption among walking delegates has tended to undermine a pestilential tyranny. The skilled workmen in the building trades have refused to continue on an equal footing with unskilled laborers; it has been announced by the president of the Brotherhood of Railway Trainmen that if the labor unions expect to hold their own they must find some less clumsy method of arranging internal discensions than by striking, and finally the fact is becoming appreciated that large works of construction and improvement, planned by railways and industrial corporations, will be indefinitely postponed unless the labor organizations become more reasonable. In short, it is apparent that both sides, the employer and the employed, are learning to recognize that their interests are mutual, and that therefore it is to the interests of both to get rid of the irreconciliable agitator whose trade is trouble.

⚒

WHAT MINERS in the so-called desert regions of Kern, Inyo, Riverside, San Bernardino and San Diego counties in California have to contend with in the matter of heat in the summer months is not generally understood. A correspondent—a mining superintendent from Inyo County—reports that it has been a mild and pleasant spring on the desert, because the thermometer had not been above 104°. He confessed that he had seen it in the afternoon at 114° in the shade, and 106° at 6 o'clock in the morning. Extremes of temperature in this region run from 26° at the lowest to 120° at the highest; moreover, this heat occurs in a region where water and shade are scarce. Nevertheless, men will stand a great deal in the search for gold, and this desert region has of late become very attractive to prospectors, since some finds of good ore have been made. It is well known that some profitable mines have been developed there also.

⚒

IN THIS ISSUE we conclude the instructive paper on hot springs by Prof. Eduard Suess, the veteran Austrian geologist. It is likely that the explanations and suggestions of Prof. Suess will prove of great value to students of ore deposits, for it is clear that the most direct road to the interpretation of the anomalies of ore occurrence lies through the painstaking observation of thermal activity. The latter serves as a link between volcanic phenomena, themselves too violent and bewildering to permit of close study, and the veins containing ore which are, as it were, the fossilized remains of thermal vents, the choked up channels along which the live waters once circulated.

To those who dwell in mining regions this connection between ore occurrence and hot springs, and between hot springs and dying volcanic energy, needs no emphasis. All through the Rocky Mountain region, and in the Sierra Nevada, too, the existence of

thermal waters in the heart of productive mining districts has been brought home by the fact that those who labor underground find frequent relief from physical ailments, such as rheumatism, through the beneficent effects of the solutions which may once have deposited the ore-bodies valuable to man and now with each pulsating wave, bring the gift of healing to weary limbs.

⚒

THE DENVER SMELTERS are again threatened with a long strike by the Western Federation of Miners. What business this organization has to dictate to the smelter men is not apparent, nor for the matter of that are other acts of this restless labor union. Four years ago the demand for an eight-hour day at the smelters was proved to be impracticable on account of the varying conditions under which the different parts of a smelting establishment must necessarily be operated. But equal pay and equal hours for all kinds of labor, difficult or easy, skilled or unskilled, is one of those tenets of labor unionism which are as much opposed to economic science as they are to the average man's sense of fair play. In this case it is unlikely that the Western Federation of Miners will succeed. They are too well known as always anxious to foment trouble, they are recognized as having been the instigators of the brutalities which disfigured the Coeur d'Alene and Telluride, as voicing all that makes for an unintelligent kind of socialism and encouraging the most cowardly forms of ruffianism. Four years ago they failed in their exacting demands because of the tact and firmness of Mr. James B. Grant, the chairman of the executive committee of the Smelting Company. There is every reason to believe that he will know how to meet the present situation.

⚒

THE STRIKE of the coal miners in Alabama, the commencement of which was briefly noted last week, affects about three-fourths of the mines. The officers of the United Mine Workers prefer to call it a suspension of work, pending the adoption of an agreement for the current year. The mines still in operation are chiefly owned by two or three of the large companies, which work them with convict labor, hired from the State; and with these mines there is no interruption of work. For several years past, the Alabama coal mines have been operated under a sliding scale based upon the price of pig iron, an arrangement which has worked very satisfactorily. It will be remembered, of course, that by far the greater part of the coal mined in the State is used by the blast-furnaces and iron companies. For two years past, the miners have been receiving the maximum rate possible under this scale, which is 55 cents a ton, and have also had steady and abundant work. This year they put in three demands: An increase in the maximum rate of 5 cents a ton, making it 60 cents; an 8-hour day, and semi-monthly instead of monthly pay-days. The representatives of the mining companies declared these demands excessive, but offered as a compromise to make an increase of 2½ cents per ton, in both minimum and maximum rates. The conference meeting ended in a temporary deadlock, and the result is the suspension of work. Negotiations, however, are still going on between the officers of the United Mine Workers and a committee of the operators, and it is quite possible that a settlement may be reached before long. Most of the iron companies have coal and coke in stock sufficient to carry them over five or six weeks, and there will be no immediate trouble at the furnaces.

⚒

A NEW DIAMOND DEPOSIT.

The opening up of a new diamond deposit at the Premier Mine, in the Pretoria District of the Transvaal, promises to be important to the diamond trade. We are informed that the neck of diamantiferous rock is much wider than that at Kimberley. In this connection several errors of statement have been made in the mining press. It has been said that the Premier gets a return of 4 carats per load, worth about 20 shillings per carat. This is an exaggeration. In the early tests the yield ran as high as 2½ carats per load, but the machine now at work is capable of handling 500 loads per day (a load is equal to eight-tenths of a ton), and the latest returns for a week's washing are as follows: 2,996 loads washed gave 2,514 carats, equal to 83 carats per 100 loads. The Premier Company claims that 10 per cent should be deducted for short weight of trucks, equal to 300 loads, and 33 per cent for "floating reef" (barren wall-rock), equal to another 899 loads, leaving a balance of 1,797 loads, and making the yield 143 carats per 100 loads. If, however, we take the yield at 83 carats per 100 loads, this is quite good enough, since the yield at De Beers and Kimberley mines, according to their last annual report—for the year ending July 30, 1902—was 76 carats per 100 loads. The De Beers and Kimberley diamonds were worth 46½ shillings per carat, or 35½ shillings per load, according to the report. The Premier diamonds are worth about 27½ shillings per carat, taking the bad with the good, as they come from the mine. On the basis of a carat to the load at the Premier Mine, which is about what it can do, every load is worth 20 shillings, not 80, as has been stated elsewhere. This deposit promises to make a very big mine.

⚒

DIRECTORS AND SHAREHOLDERS.

A recent incident illustrates what peculiar notions exist concerning the responsibilities of directors of mining companies. The upper adit of an important mine encounters a rich ore-body and the drifts which are put out on either side continue in a wide vein of high grade material. The effect of the discovery, when duly announced, is to advance the price of the shares. After an interval the directors publish a telegram from the manager stating that the drift has run into barren ground. No explanation is made. To the untechnical shareholder the bald statement of fact is taken to mean more than it represents, and there is a mild panic. Any mining engineer could have explained the news so that it would have conveyed the correct information, no more and no less. It was no part of the duty of the directors to edit the cablegram, but it was incumbent upon them, as trustees for the shareholders, to take the latter into their confidence so that no misconstruction should ensue. What actually did happen was that it was left for an outsider to give, through a London daily financial paper, just the sort of explanation which the case demanded. Since then the consulting engineer, who was, unfortunately, ill at the time of the incident referred to, has sent in his report, and before it was issued there was active buying of shares at the London end by reason of the leakage of information from the directorate. This is just the sort of thing to injure mining as an investment. It is not uncommon in London, nor is it unknown in New York. In any event it warrants the question, are directors mere speculators privileged to get inside information and use it, or are they trustees acting for the shareholders?

If this had occurred in connection with any mining company whatever it would warrant severe criticism, but it concerns one of the best mines on this continent, happy in the posession of engineering skill of the highest order and under the immediate direction of a most experienced and trustworthy manager. The criticism is aimed at a bad practice in vogue in London, and brought into relief by reason of the favorable character of the remainder of the factors in this particular case. Therefore, we ask again, is a director in a position of trust, or is he a licensed adventurer on his own account?

⚒

TIN SMELTING IN AMERICA.

The completion of a smelting works, for the treatment of tin ores, which has been erected at Bayone, New Jersey, draws attention to an enterprise of much interest. This plant is designed to treat about 50 tons per day. It contains four large reverberatory furnaces, each having a capacity of four successive charges (per 24 hours) of seven tons apiece. As the United States, at the present time, produces no tin whatever, it is evident that the creation of a tin smelting industry must be based upon extraordinary conditions.

In 1902 the consumption of tin in the United States amounted to 37,966 long tons, this being an increase of 14.2 per cent as compared to the preceding year. This consumption, chiefly in the tin-plate industry, represented 42.4 per cent of the world's production of the metal.

Under the McKinley tariff of 1890 the duty on tin and terne plates was fixed at 2.2 cents per pound, with the provision that this duty should be taken off after October 1, 1897, unless it should be shown that the aggregate quantities of such plates produced in the United States *in any one year previous* to that date had equaled one-third of the quantity imported.

On July 1, 1893, the McKinley revised tariff raised the duty on tin-bars, etc., and tin-stone (cassiterite) to 4 cents per pound. Under the Dingley tariff, of 1897, there is now no duty on pig tin and cassiterite, but tin-plate pays 1½ cents per pound.

The tariff created the tin-plate industry. It was also expected that the duty, by aiding the manufacture of tin-plate, would also stimulate tin mining no less than plating. But the tin mines petered out, both in the Harney Peak District, of South Dakota, and at Temescal, in southern California. Meanwhile, the tin-plate industry has expanded vigorously, reaching 399,291 tons in 1901, so that the imports from Wales, which amounted to 329,435 long tons in 1890, have fallen off over 80 per cent, and, instead, a promising export trade has been inaugurated. To these data we may add the mention of the fact that there are about 3 lb. of tin per box of plate weighing 108 lb. The Standard Oil Company, in the manufacture of oil cans, buys annually 1,500,000 boxes of imported tin-plate, carrying 2,000 long tons of metallic tin. Finally, the Standard Oil Company gets a rebate of

99 per cent by reason of re-export of the plate in the form of oil-cans.

Most of the tin used in the United States is Straits tin. The export duty on metallic tin in Perak was reduced from $12.50 per bharra of 3 piculs in 1895 to $11 in November 1, 1896, in accordance with the petition of the Chinese miners, who claimed that otherwise they could not make their mines pay. For the purpose of collecting this duty black tin (cassiterite) is estimated as containing 65 per cent metal, but, as a matter of fact, it generally contains from 68 to 72 per cent.

The organizers of the Bayonne smelter are credited with having made arrangements to treat tin ores, in the form of concentrates, to be imported from the Straits Settlements, obtaining the advantage of a low ocean freight by the Standard Oil tank steamers on their return from the petroleum markets of the far East. Unfortunately, the government of the Federated Malay States recently (on June 1) imposed a duty of $30 per picul (133 1-3 lb.) on all tin ore exported. This impost, plus the existing tax, equivalent to about 12 per cent of the value of the tin, is equal to about $210 per ton of black tin, or nearly 55 per cent of the value of the metallic tin contained therein. This was done, of course, to prevent the foreign smelting of the tin product of the Straits Settlements. In 1902 a total of 445,268 piculs of tin ore out of 780,871 produced—that is, 57 per cent—was exported. The newly imposed duty will undoubtedly stimulate local smelting at Pahang and Singapore, by rendering exportation unprofitable, but it is not likely to influence the production of ores.

There are, of course, other sources of supply, such as the Dutch East Indies, Australia and China, but they are unimportant compared to the Straits Settlements. The Cornish mines have a dwindling production, which is smelted on the spot.

On this continent, Alaska gives promise—with as yet no fulfilment—of tin production. Mexico has several scattered localities, which are yielding insignificant quantities. Bolivia is probably at the present time the most promising source of supply for an American smelter. The Bolivian output is sent, for the most part, to Great Britain and Germany, to be smelted for re-export principally. Last year the shipments from Bolivia to those countries amounted to 12,751 tons of *barilla* or concentrates, equal to 7,350 tons fine tin, and 1,685 tons in bars, the whole being equivalent to 9,335 tons of metallic tin. It is noteworthy that Bolivia exhibits a larger increase, in the rate of production, than any other country.

It is obvious therefore that tin smelting in the United States shares the fate of tin mining; the former will be profitable when the latter comes into existence.

⚒

MARKET CONDITIONS

With but little exception, the metal markets have been quiet during the week. The same causes which have been in operation for several weeks past still affect business. To this is added the coming of the vacation season, which has more effect every year. People generally are growing into the habit of postponing all business which is not necessary during July and August, and the season is tending to become one of quiet trade. Consumption in most lines continues good, and manufacturers are generally working on old contracts, but new business is not plentiful.

Copper again shows a slightly lower range of prices. Buying has been on a moderate scale only, for consumers' immediate necessities. There has been, however, more inquiry for metal. On the other hand, sellers show an inclination to meet the market and to take what business is going. The suspension of work at the Anaconda, in Butte, means a reduction of 10,000,000 to 12,000,000 lb. in the output. Under present conditions, however, the market will not be seriously affected; although the shortage may have its effect later in the season. Orders from abroad have been somewhat better, and most of them are for immediate shipment, showing that consumers in Europe are not well supplied.

Tin has been quiet, with a moderate consumptive demand, and little change in prices.

In lead there has been some pressure to buy. The labor troubles in Colorado closing down several of the large smelters will mean a short supply of the metal for a time. Strikes are also reported in the Southeastern Missouri District, which may interfere for a time with supplies from that section. No change in prices has been made, however. On the other hand, the interruption to the railroads by the recent floods is now practically over. The strike at the Broken Hill Mines in Australia will tend to raise the price of lead abroad.

Spelter is somewhat easier, and supplies are better. Demand continues, however, well up to the average, and producers are having difficulty in meeting all calls promptly. Shipments from the West are now being freely made. The Joplin ore market continues about on the same level. Ore is taken up as fast as produced, and there are no accumulations in the bins.

Silver is quiet, showing little change. The foreign coinage orders have been generally supplied. The usual purchases for Philippine coinage continue to support the market to some extent. On the other hand, India has been a poor buyer, and there is no immediate probability of any considerable purchases by the India Council.

The iron market, like the metal markets, is feeling the effect of the vacation season, as well as of the waiting policy. While mills and furnaces are generally busy on contracts running through the third quarter of the year, new business has been rather scarce. Foundry iron has been somewhat lower and buyers are evidently hoping for further concessions. In steel billets a lower scale of prices seems to be probable, and manufacturers are buying very sparingly in anticipation of the change. The labor troubles in the building trade still continues to effect the market for finished material, and very little new business is reported.

The Western coal market is still steady. Lake shipments have been interrupted by delays in loading at the lower ports. At the Lake Superior receiving docks a congestion is reported, the railroads being unable to carry away the coal as fast as it is delivered from the Lake steamers. Local supplies are very satisfactory, and local trade is quiet.

The Atlantic seaboard bituminous trade continues quiet. There is still some complaint of short car-supply at the mines, and deliveries at tidewater ports are rather slow. All-rail trade continues good, and the demand for Long Island and nearby Eastern ports is steady. For the far Eastern and shoalwater ports, trade is rather quiet.

In the anthracite trade there is no material change. Demand is strong both at tidewater ports and in all the territory served fro mBuffalo. Domestic demand in the Eastern cities continues very good, buyers being evidently disposed to lay in stocks to a greater extent than was ever known before. Shipments from the mines continue large, and it is generally accepted that there will be no further labor troubles for the present. Buyers, however, have not forgotten last winter's difficulties, and are evidently disposed to lay in stocks while coal is in good supply.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Men of education are needed to drag men of experience out of the rut.

The man who has a good active mind and theoretical basis, with even a small amount of practical experience, is capable of dealing with new questions in an intelligent way.

The discovery and propagation of every truth, and the dispelling of every error, tends to improve and better the condition of man, though the act of reforming old opinions and institutions causes so much pain and misery.

On the slopes of Etna, in Sicily, ice has been taken from under a current of lava. In 1852, while the eruption was going on, during August and September, blocks of ice were quarried from under a cover of sand and lava, 10 ft. thick. The ice had formerly been snow, which the lava had overflown, its under surface becoming encrusted so quickly as to stop the passage of heat to the snow underneath.

In the advancement of Science, the undertone of truth, in spite of the occasional falseness of particular views, is comparable to the grandly thunderous voice of the sea which is quite distinct from the dashing of the separate waves.

The effects of rare combinations of the most ordinary causes are scarcely ever reckoned upon enough in geology.

The great difficulty encountered by those who struggle in search of knowledge in any form is the enormous indolence of mankind, who will never look into evidence until goaded on to it by some stronger motive than the mere love of abstract truth.

Perhaps at no time in the history of the world have many educated people shown more ready credulity. Indeed, it seems as if the more grotesque and preposterous an idea, the more likely it is to receive attention. And this credulity is not confined to those who are altogether ignorant of science. A man may be a narrow expert in one branch of science and be wholly ignorant of the rules of the game in reference to another science. For instance, when an eminent biologist says "bell-ringing, the playing on musical instruments, stone-throwing and various movements of solid bodies, all without human contact or any discoverable physical cause—still occur among us as they have occurred in all ages," the statements show the author to be so lacking in a comprehension of the principles of physics that he is unable to estimate whether a phenomenon of physics is likely or not likely to be true. It is clear that a man may be an authority as to biology, and yet be so ignorant of the rules of physics that he may be as simple as a child in reference to that subject.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

GOLD MINE ACCOUNTS.

The Editor:

Sir.—I am glad to accept your invitation to make some remarks on the subject of gold mine accounts. All efficiently managed mines these days have systematized accounts showing in result the working cost per ton of ore. But there is a most harassing lack of uniformity in the method by which the last result is arrived at, and in this some discussion in your esteemed JOURNAL could be most useful.

First and foremost, mine accounts should be systematized in such a manner as to prevent fraud, and to be presented in such a way as to carry conviction of honesty to the owner. Second, the accounts should be prepared in such a way as to show the expenditure in various departments on some unit basis, so as to enable the manager and his staff to compare results of various departments and various periods within his own mine and also to compare results with his neighbors, that he may be assisted in his intermediate campaign for economy and improvement. Third, to be presented in such a way that the owner, director, shareholder or what not may, by comparison, determine something of the efficiency of the manager himself.

At the outset I do not want some half-baked person to rise and remind us that the varying conditions under which mines of different countries work, or mines of the same country, for that matter, or even mines on the same vein, or even different parts of the same mine may render comparisons misleading. We all know that the factors which govern working costs are cost of labor, supplies, size of orebodies, character of the ore, volume of ore treated, depth, etc., etc., and that these factors are never precisely the same in any two mines, nor for any two months, and that *pro-forma* comparisons may give the best man a black eye and put an inefficient man on a high pedestal. But, all this does not render comparisons valueless, for in the hands of the man who knows the conditions, these same working costs enable the manager to determine very quickly the avenues for improvements or efficiency of a department or the owner of the mine to determine the efficiency of the manager himself. The rivalry growing out of such comparisons in its incentive to economy and highest efficiency, when tempered with capacity, has been by no means the least factor in reducing gold mining from an absolute speculation to an industrial enterprise. In order that these valuable influences should have full play, there is a crying need for greater uniformity in the formulation of mine accounts into the ultimate results as working costs. This is not a new idea, but the usefulness of it is more evident these later years, because of the constantly increasing publicity of working results arising out of the larger proportion of mine ownership by public stock companies, and therefore the publicity of accounts render results available for comparative pruposes.

The first purpose of accounts requires no discussion here, for it is a matter of competent book-keeping, and deflections are matters for the police to look into. The usefulness of the second and third purposes depends for its greatest possibilities upon uniformity in the same mine and on neighboring mines, and still better, on all mines. As said, all well-managed mines show results of expenditures in working costs on tonnage basis, but the variation in method of allocation of expenditures to various departments differ most harassingly. In the first instance in America and South Africa, the short ton is used, while in Australia and India the long ton is used, and therefore the latter are 10 per cent different. In most English owned mines, expenditure is divided into "Capital" and "Revenue," development and construction being generally charged to the former, and written off the latter and thus to working costs, by redemption or depreciation, and a wide variation exists in both the character of the expenditure charged to capital in the first instance, and in the amount charged off afterwards. For instance, in development, some managers charge winzes and raises to development, and others to stoping. Some even charge repairs and renewals to capital, on the theory that they keep the plant up to a fixed state of efficiency. In writing development off by redemption or depreciation, some companies do it on the basis of the average cost per ton developed, others, to beat the income tax commissioner, write off all he will allow. Some companies write off depreciation of plant on a known life for the mine, others on a hoped-for life. Some companies distribute a part of the general charges over capital expenditure, others charge it all off to revenue at once. Some managers charge pumping to ore extraction and some partly to development, while others charge it partly into milling, as being the source of mill water. In ore treatment, some companies give cost of treatment on one generalized figure, which is valueless for comparison, because one ore may involve one operation, while another may involve five. Most companies distribute treatment costs over the whole tonnage milled, yet the proportion of tailings treated by cyanide, for instance, may vary from 50 per cent on one mine to 100 per cent on another. Some companies deduct the cost of realizing bullion from their receipts, while others charge it to working costs, etc., etc., *ad infinitum*. In a few instances, there is evident intention on the part of the management to obscure real costs, but in most it is merely difference in method and of opinion. Another feature worth discussion is how far expenditure for dissection of costs is warranted by results to be attained, and how detailed it can be done within the realm of accuracy. It is on these matters which, if an agreement could be reached, discussion would be most valuable. It might be a work for the American Institute of Mining Engineers and the English Institution of Mining and Metallurgy to appoint a commission to formulate some plan of working cost statements, as a result of such discussions. I am sure the profession would loyally introduce and adhere to such a plan, and it would meet the approval of the mine owners at the same time, for the results could but be beneficial to him in the end.

H. C. HOOVER.

London, June 16, 1903.

GOLD IN DIORITE.

The Editor:

Sir.—In your issue of April 18, 1903, I have just seen an abstract from a paper by Mr. Lewis B. Brown, entitled "Gold in Diorite." It may be of interest to your readers to know that at the Ayrshire Mine in Mashonaland a diorite dike is being worked for gold. The dike is situated within 100 ft. of a granite country, but is not in actual contact with the granite. Its strike is approximately east and west, and it dips at an angle of about 80° to the north; both walls are schist, chlorite and hornblende. The country to the south is granite; that to the north consists of chlorite and hornblende schists, seamed by numerous bodies of hornblende rock, diorite and feldspar. There are very few quartz veins in the neighborhood, and none have yet been discovered carrying payable gold. The Ayrshire dike varies in width from 4 to 60 ft. The western end, which is the richest, averages about 20 ft. in width down to the 357-ft. level, and parts of it are worth 3 oz. to the ton; exceptional assays showing upwards of 45 oz. to the ton, over a length and breadth of 5 ft. The average stoping width in the western section is 10 ft., which is calculated to return about 12.5 dwt. per ton. In the eastern section the gold is much more generally distributed in the diorite, some of the stopes here being 25 ft. wide. The average width of the stopes in this section may be taken at 14 ft., of a value of 7 dwt. to the ton.

There is absolutely no guide as to which is payable and which is non-payable diorite, as the whole of the dike is auriferous, more or less. The only means of following the pay ore is by careful and systematic sampling, as in some parts the pay ore is on the north of the dike, in other places in the center, and again on the south side. The dike in parts of the oxidized zone, shows a distinctly gneissoid structure; this, however, seems to disappear as depth is attained. Feldspar seams, varying in width from 2 to 8 ft., occur in the upper levels of the dike, but are not so noticeable in the lower levels. These feldspar seams carry little or no gold, though in places they have rich payable rock on both sides of them. Numerous inclusions of chlorite and hornblende schist occur in the dike, being "frozen" to the diorite on every side. These inclusions do not, as a rule, carry more than a bare trace of gold. The dike has been proved to a depth of 600 ft., and at that depth the gold values, where the diorite has been sampled, are practically the same as in the top levels.

No other auriferous diorite dikes have yet been discovered in the district, but very little prospecting has been done, the Ayrshire having been located on account of the large old workings left by the ancients. The gold is free-milling, and the small amount of pyrite contained in the rock, carries little gold. The gold occurs both fine and coarse, pieces having been found in the mortar-box weighing as much as 1 dwt. The gold is embedded in the diorite itself, and not to any extent along the line of cleavages. It is of rather higher value in the western section than in the eastern, the respective fineness being .944 for western gold and .911 for eastern.

E. D. BERRINGTON,
Manager Ayrshire Mine.

Lomagunda, Mashonaland, May 28, 1903.

(This occurrence is undoubtedly of great scientific interest. The specimen, which Mr. Berrington has sent us, is a beautiful example of gold in diorite. There is apparently no vein quartz present, while the gold is comparatively coarse and readily visible to the unaided eye. The relation between the hornblende schist, the diorite and the granite must afford a good field for investigation. On the face of it one might suppose that the diorite and the schist were local variations of the same rock, affected by metamorphism and shearing. Those of our friends who advocate ore formation by magmatic segregation will be warranted in quoting this evidence. We tender cordial thanks to Mr. Berrington for his interesting observation.—EDITOR.)

ELECTRIC DRILLS.

The Editor:

Sir.—During the two years' administration of the present management of the Marvin Electric Drill Company we have not received a single complaint of heating from any users of our drills. We have yet to learn of any man who has been taught to operate our drills, without having a previous attachment for some other power drill, wanting to leave them to run some other kind. We have learned that in a quarry where our drills were placed among steam drills, in the course of a couple of months the steam drill men wanted to get on our drills, and the men who were running ours did not want to make the change.

Our drills run warm, and when properly handled may rise 30° to 50°, or even more, above the surrounding temperature. In roomy places the heat radiated is no disadvantage and may, under many conditions, be used to advantage in improving ventilation. In close places the heat might become uncomfortable, but this objection is easily overcome by means of a direct-connected electric ventilating fan.

It has recently come to our notice that our drills are stated to heat excessively, even to the extent of melting copper wire. As an experiment, with a surrounding temperature above 90°, we have run our drills continuously for more than two hours, something that would rarely happen in practice, as stops would have to be made to change steels, or to move to a new hole; but after the run the drill was not

hot enough to melt copper or even soft electrical wire solder. A piece of dry white cotton waste, put between the coil and slide, at the end of the run, and left until the drill had become cold, required a close examination to see the effects of heat; applied to the nose a faint scorched odor could be detected.

THE MARVIN ELECTRIC DRILL COMPANY.

Binghamton, N. Y., July 1, 1903.

MINE SAMPLING.

The Editor:

Sir.—Mr. Richard A. Parker, in your issue of July 4, touches upon a subject of interest to those whose duty it becomes sometimes to sample auriferous deposits.

Mr. Parker's meaning, in the letter referred to, is not altogether clear. Does he mean that the concentration of the gold in the interstices of the duck places *during* the rolling of the sample which had broken up to pieces about ½-in. size, or *after* the final quarterings had been crushed to about ⅛-in.?

If the former was the case, how was the gold transferred from ½-in. pieces of a wet and sticky quartzose schist into the pores of an ordinary sampling cloth?

If the concentration took place *after* the final quarterings, how does it come that those quarterings assayed $14.80 and $3.50, respectively? Why was not the concentration equal in each of the quarterings?

The question of gold being removed from samples and caught in the interstices of a sampling canvas, is an old one. The writer had an experience of a similar nature some years ago. The promoter of a gold mining property urged as the cause of extremely low results obtained from a sampling of the various openings, that the writer had broken down the samples onto canvas, and quartered them down on same, rolling them over and over as many as twenty times or more. He enclosed with his letter a piece of the canvas to show how easily the gold could be caught in it. He failed, however, to explain how the gold got out of the quartz, for the samples were large ones, and the material was broken to about the size of hickory nuts.

W. L. AUSTIN.

New York, July 6, 1903.

SECONDARY ENRICHMENTS.

The Editor:

Sir.—In your issue of May 30, I notice that Mr. John D. Burgess, in speaking of Lindgren's statements regarding the secondary nature of chalcocite, writes as follows: "If Mr. Lindgren were to attempt to apply that theory or conclusion to Arizona mines he would have to do it in an inverted position. Almost universally the opposite is the fact."

Probably the most extensive chalcocite deposits of Arizona occur in the Clifton-Morenci District, the Humboldt Mine belonging to the Arizona Copper Company, Limited, being a good type of this class of deposits. How any one conversant with the copper mines can attribute any other than a secondary origin to these ores, I cannot imagine, as the deposits are simple in their relation to the overlying and leached out portion of the vein. Here one finds an almost completely leached out vein-stuff locally known as porphyry, which at the average depth of 150 ft. begins to carry chalcocite, generally distributed through large masses of rock and constituting a low grade ore containing this mineral in small particles, sometimes crystalline and often amorphous. It also occurs in smaller concentrated fissures. Iron pyrite is nearly always associated with the chalcocite. Very frequently the iron pyrite is itself coated with chalcocite, as in the synthetic experiments described by Horace V. Winchell, in a recent number of this Journal, being probably the strongest proof that these deposits are secondary.

J. D. AUDLEY SMITH.

Valdez, Alaska, June 19, 1903.

ACROSS THE SAN JUAN MOUNTAINS.

BY T. A. RICKARD.

(*Continued from Page* 10.)

The dike, to be seen in the Bachelor workings, is called by the miners, of course, "porphyry," but it consists of fragments of quartz, from sub-angular pieces as large as a thumb-nail to grains of sand, and of flat pieces of black shale; the latter are very prominent, and give the dike-rock a distinctly mottled appearance, as the accompanying photograph[1] shows. They vary in size from microscopic fragments to bits several inches long. Besides these the dike contains pieces of sandstone, often micaceous by reason of sericite. A characteristic of the dike-rock is the arrangement of the shale fragments with their longer axes parallel to the walls of the dike; this is more marked in some parts of the mine than in others, and it is usually most pronounced close to the walls. (See Figs. 2 and 3.) The latter form a distinct parting from the outer country, and sometimes are also accompanied by a selvage.

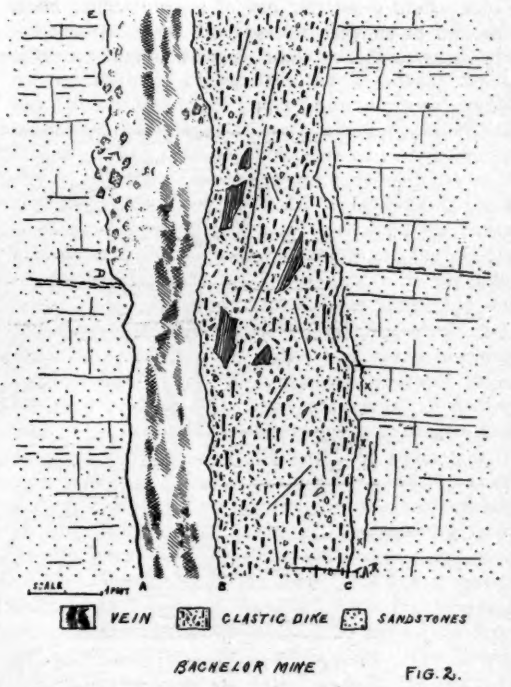
FRAGMENT OF CLASTIC DIKE.

Natural Size.

This, like the one we saw at the American-Nettie Mine, is a clastic dike and the origin of it affords good material for speculation. Mr. F. L. Ransome, of the United States Geological Survey, has contributed an interesting paper[2] on the origin of this very dike, and he explains it thus:

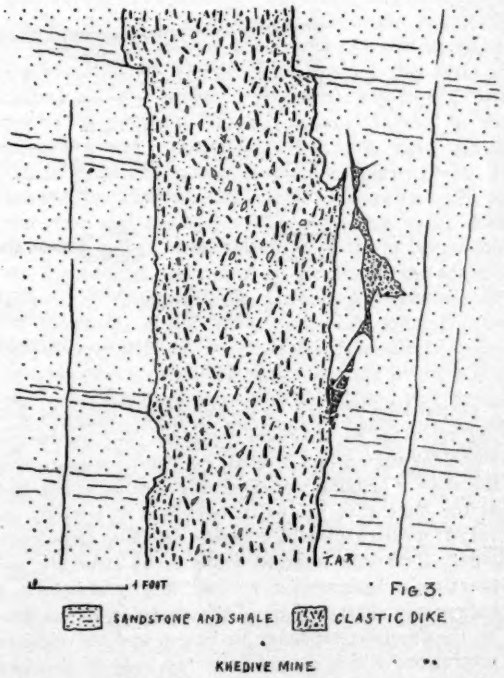
"A fissure was formed, accompanied by some faulting, and was filled, chiefly from above, by fragments of the soft fissile black shale, which does not occur in the stratigraphically lower beds exposed in the immediate vicinity, and partly by material from the lower light-colored beds forming the present walls."[3]

That this pseudo-dike is built up of fragmentary sedimentary rock, that it occupies a fissure, and that it contains no lava or other volcanic matter as a cementing material—these data seem to be assured. The nice point about the problem is the mode of formation. Was it from above or below? Mr. Ransome accepts the first alternative and in support of this view he is enabled to instance the sandstone dikes which Whitman Cross found in the granite near Divide in Colorado, which, elsewhere, Darwin, Ussing, Irving and others have described, and ascribed to a filling from above. Hugh Miller found a pseudo-dike in Cromarty (Scotland) in which a mass of sandstone working in from above (probably) contained fossils. Diller wrote a memoir[4] on the sandstone dikes of California and concluded that they were injected from below.



BACHELOR MINE FIG. 2.

In the Lipari Islands there occur masses of volcanic tuff, hard enough to be fractured, which exhibit cracks filled in with fallen dust and scoria.[5] But this is an entirely different kind of occurrence, as also is that observed at Pontgibaud (France), where a silver-lead vein occurring in granulite is shattered, together with its encasing rock, and, for a length of 10 meters, at a depth of 50 meters, contains boulders of scoriaceous lava evidently derived from the alluvium which once covered the outcrop of the vein.[6] It is obvious that occur-



KHEDIVE MINE FIG. 3.

[1] This photograph is taken from the *Transactions* American Institute Mining Engineers, vol. xxx, page 231.

[2] "A Peculiar Clastic Dike near Ouray, Colorado, and its Associated Deposit of Silver Ore," by F. L. Ransome. *Transactions* American Institute Mining Engineers, vol. xxx, pp. 227-236.

[3] *Op cit.*, page 230.

[4] *Bulletin* Geological Society of America, vol. i, pp. 411-442.

[5] My authority is my friend Professor Judd, author of "Volcanoes" and Dean of the Royal School of Mines, London.

[6] ENGINEERING AND MINING JOURNAL, p. 151, August 18, 1894. "The Lodes of Pontgibaud," by T. A. Rickard.

rences of this kind, at surface or near it, are quite different in their origin to a clean-cut fracture many hundred feet underground, of great length and depth, and persistent width. It is, however, worth while to emphasize the distinction.

As between filling from above by gravitation and filling from below through pressure, I am decidedly inclined to choose the latter. In the first place, no mining engineer familiar with the shifting of wall-rock would grant the idea of a maintenance underground of an open fissure, both large and crooked, in rocks so soft as these shales and sandstones, for broke through the harder sandstone series and died out when it met the tenaceous, shifting and more flexible layers of shale, much in the manner observed in the Enterprise Mine. See Fig. 4.[7] Finally, it is said that the black shale does not occur in the lower beds observable in the vicinity of the mine workings. I thought so, too, until, on the occasion of my second visit, I noticed an exposure of black shale near the roadside at a point a short distance below the Bachelor mill, and, presumably, not much deeper than the present workings of the mine. This points to the probability of there being other layers of

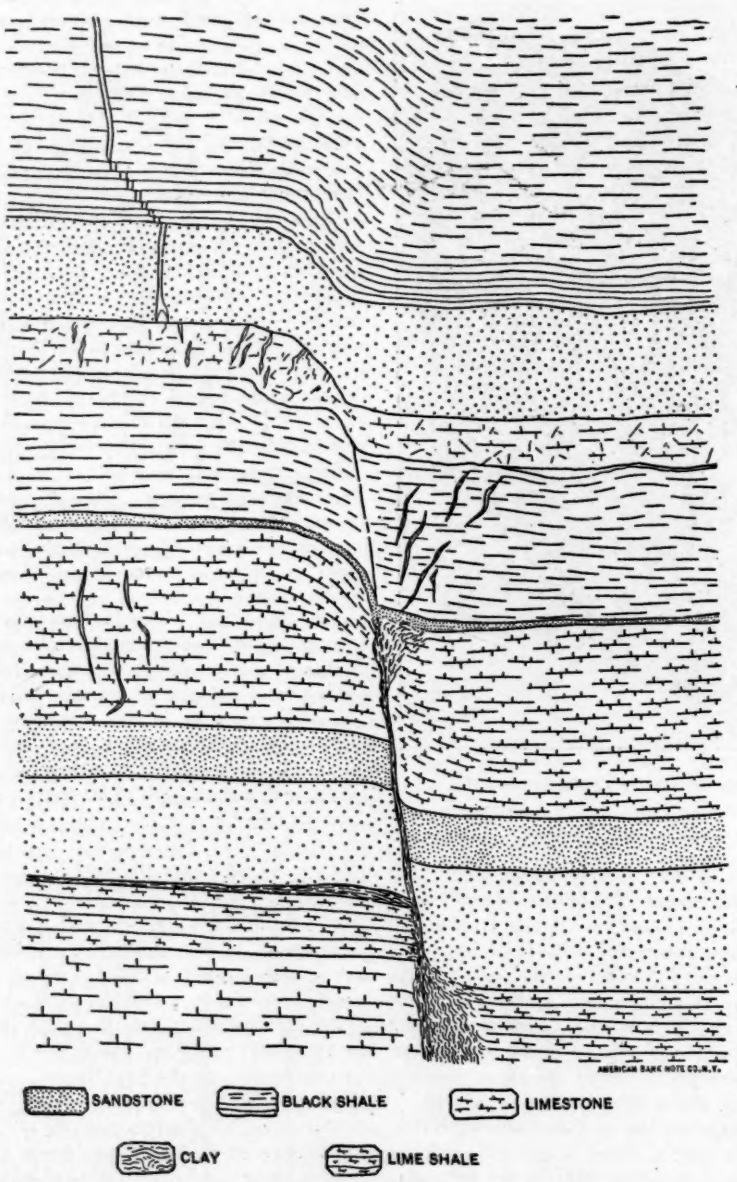


FIG. 4.—DISAPPEARANCE OF A FAULT.

a period long enough to permit of the complete filling up of the suppositious *crevasse*. The sandstones and their alternations of shale exhibit movement along the sloping bedding planes, as might be expected, and in the mine care has to be exercised to prevent injury from the rock which breaks off along these partings. Next, the internal evidence of structure appears to be against such a view. Fig. 3 illustrates a noteworthy characteristic of the Bachelor dike, namely, the frequent tendency to bulges and to vein-like protrusions which extend from the body of the dike *upward* into the surrounding country; no downward filling would, so it seems to me, explain this condition of affairs.

The fragments of black shale are traced by Mr. Ransome to an overlying bed through which the dike does not penetrate. Because it does not pass through this shale bed it is inferred that the latter was the source of much of the shale scattered through the dike. But why should not a simpler explanation suffice? Namely, that the fissure occupied by the dike black shale amid the sandstone series traversed by the dike and renders it unnecessary to go far afield for a possible source of the black slivers which are so characteristic of the clastic rock. May it not have happened therefore that the dike was formed by the crushing of sandstone and black shale along the line of a fissure which was filled with this material as the fissure was slowly formed, much as water rises into a crack in the overlying ice? The close packing of the material within the dike, as is indicated by the arrangement of fragments of shale parallel to the walls, is suggestive enough of subsequent pressure, and it is not without a further suggestion that greater pressure, but from below, may have originally pushed the clastic material upward into the fissure as it was formed. Water may have been present to give additional mobility to the broken matter, such water subsequently having been largely expelled by the squeezing in of the fissure walls. Prof. Judd examined some specimens of the Bachelor dike which I sent to him, and he concluded that the consolidation of the fragments was due largely, if not entirely, to the later chemical action of percolating solutions. To this suggestion there is the confirmation afforded by the subsequent deposition of ore along the course of the dike.

In Figs. 2 and 3 the Bachelor dike is illustrated. Fig. 2 exhibits the relation of the vein to the dike. A B is quartz, carrying streaks of galena and gray copper (tetrahedrite). There is also some blende present. Inclusions of country (sandstone) give the vein a mottled look along its outer edge, between D and E. The clastic dike B C contains several large pieces of shale, and a few signs of ore. The fractures alongside the dike, at XX, appear as dark threads of sulphides. In Fig. 3, taken at the east breast of the main drift in the adjoining Khedive Mine, the clastic material is 17 ins. wide, and exhibits one of those vein-like branches or off-shoots which are occasionally to be seen. In this regard the clastic material behaves just like a lava. The set off at the top of the section is also a common feature. Sympathetic fractures occur in the encasing rock. In this instance the vein had merged into the dike and could only be seen vaguely in the form of patches of ore within the body of the dike.

The whole occurrence is one of great interest. If these clastic dikes are studied with reference to true lava dikes on the one hand and veins of asphaltum and gilsonite,[8] on the other hand, it should be possible to arrive at a clearer idea concerning the general question of the manner in which rocks undergo that fracturing which precedes ore deposition.

[7] Taken from *Transactions* American Institute Mining Engineers, vol. xxvi, page 944. "The Enterprise Mine, Rico, Colorado," by T. A. Rickard, pp. 906-980.

URANIUM.

Uranium is one of the rare metals for which there is a limited demand. The present world's consumption amounts annually to about 300 tons of uranium ore, yielding from 3 to 13 per cent of the metal. For several years Colorado has supplied the United States output, nearly all of which goes to Europe. France, England and Germany are the principal markets. Uranium is a hard, very heavy (9.184) moderately malleable metal; it resembles nickel and iron, and has the color of nickel, at ordinary temperatures it is not affected by air or water; at red-heat, however, the surface oxidizes. The chief ore of uranium is the oxide, called pitch-blende or uraninite. It occurs also as the phosphate and arsenate. The ores are found in Gilpin and other counties of Colorado; in Cornwall, England; and in Saxony, Germany. Buyers of the ore generally pay from $15 to $20 per unit, according to the percentage of uranium contained. Until recently uranium salts were used chiefly as a pigment in painting on porcelain, in photography, and as a coloring ingredient in glass manufacture. It is now being used experimentally in the manufacture of alloys of iron and of aluminum. Uranium increases the hardness and elasticity of steel, also the hardness of aluminum, but this use has not yet become sufficiently important to cause an increased demand for the metal.

ELECTRIC STEEL.—French exchanges report that steel produced in the electric furnace is no longer a mere laboratory production, but is now being turned out on a commercial scale at the Froges Works (Isère), France. It is being put on the market by Messrs. Descours, Cabaud & Co., of Lyons.

LOSS OF STEEL BY FRICTION.—Friction is responsible for the loss of about 247,000 tons of steel in dust from the railroads of the world yearly, according to tables submitted to the mining and smelting section orf the International Chemical Congress, by Dr. A. Haarman, of Osnabruck. Of this amount 19,000 tons is lost through friction in the German railroads alone.

[8] "The Asphalt and Bituminous Rock Deposits of the United States," by George H. Eldridge. United States Geological Survey.

MINING IN SOUTH AFRICA. I.—THE TRANSVAAL GOLD PRODUCTION.

BY J. H. CURLE.

In August, 1899, just before the start of the Boer war the Transvaal was producing gold at the rate of $80,000,000 a year; and, if an ample labor supply were obtainable, this rate of production could be resumed within a few weeks. This in no sense represents the high-water mark of production, for it is almost a certainty—given sufficient labor—that the output will go on increasing until in a few years it has reached a round total of at least $150,000,000. Indeed, so far as production is concerned, there seems hardly any limit to the Transvaal's future gold yield. Since the war there has been an immense deal of diamond-drilling, and the area now proved to carry the gold-bearing conglomerate beds is extending in all directions.

These are duly considered statements, based on an intimate knowledge of the subject in hand; if the reader gathers from them the impression that, as concerns gold-production, the Transvaal is going to be first and the rest nowhere, he will be making no mistake. But this fact, wonderful as it is, is of small value unless one can draw some profit from it; that can only be done by looking closely into the whole subject of the South African mining industry.

The first thing to be noted is the average value of the ore; and this, in spite of its regularity and immense quantity, we find to be low grade. According to the Witwatersrand Chamber of Mines the average yield of the fifty or so companies now producing is about $10.50 per ton of 2,000 lb. But that is not the average value of the conglomerates. The mines now working are those which have the richest ore, and they represent only a small area of the total which is going to be worked in the future, the average grade of which is lower than that of these picked patches. I believe that the average yield of all the conglomerate-bearing areas which have been floated off, or which are going to be floated whenever opportunity offers, will not work out at more than $8 a ton. It is well known that many of the poorer mines contain ore which will not yield more than from $6 to $7. At present these are not being worked, because labor is scarce; in the past they have often failed to meet working expenses, and none of them have repaid the big sums sunk in their equipment.

We grasp, then, this big fact: That the Transvaal conglomerates are essentially low grade; that their average recovery value is nearer $8 than the $10.50, which writers often credit them with, and that many of the lower grade mines have never yet worked at a profit.

Personally, with conditions as they are, I wouldn't give a jot for a low-grade mine in the Transvaal. When that country is turning out its $150,000,000 annually, a large part of the output will come from such mines, but this bullion will be produced at no profit, or even, in the long run, at a small aggregate loss. The poor mines will be restarted, sooner or later, and many more poor areas will be equipped on a producing basis. These will all be worked spasmodically, as in the past. Now and then conditions will appear favorable, and energetic financiers will, from time to time, pour more money into them; but in the long run they will be found to have been operated without profit. With rare exceptions any mine yielding less than $7 a ton falls into this category, and there are more mines of this value in the Transvaal, than most people are aware of.

I must not forget to point out that in the Transvaal the conglomerate beds do not form the only gold-fields; in the northeast there are several districts where the ore is of a different nature. On the Lydenburg field, for example, there are narrow, flat-lying beds of aqueous origin, in no sense resembling the conglomerates; these are gold-bearing and have furnished, here and there, a rich patch. On the De Kaap and Murchison fields are found ordinary quartz ledges, which, on the whole, have turned out ghastly failures. Occasionally these ledges show rich patches near the surface, encouraging the owners to go deeper and deeper, but I cannot recall one mine which has held in depth. The best known of these quartz mines, the Sheba, is now poor in the lowest levels. A lot of people, with their fingers on the pulse of the London stock market, keep fiddling about with these mines. These districts are gravely alluded to when summing up the capacity of the Transvaal, and their formations are described learnedly by geologists; but after considerable experience I am of the opinion they are no good, and need not be taken seriously.

As I have emphasized the fact that very much of the Transvaal conglomerate is unpayable, it is only fair to state, as against this, that there are big areas of ground which will yield the higher average of $10 a ton. There are at present, as we have seen, about 50 mines at work, averaging a recovery of $10.50, and as many of these mines will, in course of time, work up to a capacity of 200 stamps, the greatness of the gold-field becomes apparent.

These richer mines are at present only working at one-half or two-thirds their crushing capacity, and are falling behind even that in ore development. The reason for this is not lack of ore, but lack of labor to get it out. The labor supply—that is, South African natives—is hopelessly short of the demand, and is such a serious question that the prosperity or otherwise of the Transvaal mines is now hinging upon it. Things are almost at a standstill out there at present.

This state of affairs is intolerable to the capitalists and mine promoters. Their role is to take up and develop new ground, and to talk vaguely of the immense possibilities being opened up by bore-holes and such like. The less imaginative person or the shareholder in the established mines, takes quite another view. He says, "Let us first get the industry back to the position it was in before the war, when all the richer mines were producing at the maximum capacity, and earning big profits. After that you can allow your imagination to run riot, and produce a 'boom'; but in the meantime moderate your ideas and show us some tangible results. It all depends on the labor question. Let us fight that out first, and straight away; never mind anything else, but let us get a labor supply." To do him justice the capitalist is now tackling this question in earnest, for he realizes that it must be solved before the Transvaal can go a step further.

The shortage in the supply is appalling. There are now about 65,000 natives working in the mines, but there is immediate need for 150,000, and within three years for a total of 300,000. Africa can, under no circumstances, supply anything like their number. My own idea is that the mine owners should bring in Chinese, and they themselves realize that this is the best course. But this will mean a big fight with the white working man, and with the storekeeper; and until this fight is over, stagnation must continue in the Transvaal. It is all very well, as many people do, to rush into this question armed not with knowledge but with prejudices, and tell us that the Chinaman must not be allowed to enter the country. These people denounce, but they can offer no alternative solution of the question. Labor the mines must have. If those who are most fitted to decide say that the Chinaman is the best all-round worker, and if those who own the mines agree that they want to bring him in, it constitutes a strong argument in his favor. It is not suggested that he is to be allowed to overflow the country, as he did California and Australia. He will be brought in under government indenture, terminable in his own country; he will be set to work only in certain defined areas, and he will be used as a miner pure and simple. No Chinese carpenter, gardener, washerman or storekeeper will ever raise his modest signboard within the Transvaal's borders.

I can understand that this question has many times been put in America: "Why on earth do they want blacks, or Chinese, or colored cheap labor of any sort in the Transvaal? We can work $10 ore in the States with white labor, and show a big profit; why can't they do the same in Africa?" This is a fair enough question; indeed, I have put it to myself more than once. At the Homestake, on the Mother Lode, in Colorado, I have seen ore handled by white labor at less cost than it is handled by black labor in the Transvaal. Mining conditions in the two countries don't vary seriously, yet the mines at Telluride, Colorado, 11,000 ft. up in the Rockies, where labor is $3.25 a day, work as cheaply as do those at Johannesburg where the miner's daily pay is barely 60 cents.

It is an axiom in mining that the dearest labor always works out the best in the long run, and I have no hesitation in saying that the Transvaal mines, now worked by natives under white overseers, would produce more cheaply, if worked entirely by skilled whites. But it must be at once stated that the country is entirely unorganized to meet such an economic change, nor could it be brought about for a good many years to come. In Africa the black man has always been the hewer of wood and the drawer of water. The white laborer refuses to do the tasks which have been allotted the natives from time immemorial, and this strong caste feeling would preclude any such idea as whites and blacks working together in a stope. The only course would be to banish the black man from the mines altogether. But is the country in a fit condition to receive and support the hundreds of thousands of white miners, who would be needed, their families, and the satellites who would accompany them? It emphatically is not. The cost of living in Johannesburg is at present very high. Statistics show that a miner to support himself and family must spend $120 a month, and as he would be earning under the proposed white labor scheme theoretically no more than $100, he would shortly become a bankrupt. The Transvaal is many hundreds of miles from the sea, and South Africa is not a food-producing country; so every pound of food he would consume there, every drink, every article of clothing, every small luxury, would have to reach him after a long sea transit, a costly rail haulage, and the payment of stiff tariff taxation. His house materials and furniture would be imported; his meat would come from Australia or America; his bread from Canada; his butter from New Zealand or Denmark; his drink from Europe; his clothes from England. He would thank heaven that such a thing as fresh vegetables were procurable locally, though at a stiff price, and would eventually borrow money to take him home, whence he came. Of course, I do not say that, in time, this state of affairs will not be much improved; but it will take years for prices to reach a normal level. In the meantime the organization does not exist which would make living even reasonably cheap; the white laborer has to receive an excessive wage to make up for this; and the bulk of the work has to be done by cheap native labor. It has been lately figured out by the leading engineers of the Rand, including a number of Americans who are fully alive to the value of the most skilled labor, that white labor for the mines is, at present, not possible. It would be necessary to pay such a high wage that the average cost per ton would be increased $2.50, and this would turn three-fourths of the paying mines into losing mines. I think they have made out their case clearly. Some day, when we get the skilled miner there for $3 a day, we will kick out the Kaffir; but in the meantime we want all of him that is offering, and, failing the Kaffir, we urgently need 200,000 Chinamen.

GOLD IN INDIA.—A discovery of gold-bearing quartz is reported at Harpanhully, in the Billary District in India.

ELECTRICITY AT ENGLISH COLLIERIES.—According to the London *Colliery Guardian*, during the past few months Bolckow, Vaughan & Co., have spent a large sum of money in putting down electric power at their Binchester and Westerton collieries. Following upon these improvements, the firm have now entered into contracts for similar machinery at their Auckland Park colliery. The only steam used at the colliery will be for the hoisting engine.

THE PAYMENT OF EXTENSIONS OF MINING PLANT OUT OF REVENUE.

BY OUR LONDON CORRESPONDENT.

In a recent London letter I referred to the principle laid down by Mr. C. Algernon Moreing at the meeting of shareholders of Great Fingall Consolidated, that all expenditure on development of a mine and extensions of metallurgical plant should be paid for whenever possible out of revenue. The question before the shareholders was whether the new plant should be paid for by additional capital raised by the issue of new shares or whether the large balance of divisible profit (some £100,000) should be devoted to that purpose.

The incident opens up the general question of the suitability of the ordinary methods of accounting to the special case of mining, and some discussion of the subject would be opportune.

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This is the theoretical principle, but the method of carrying it out depends upon the circumstances of each individual case. It need hardly be said that the great desire of directors is to show that they can declare a dividend, and whenever extra expenditure becomes necessary for the purpose of sinking a new shaft, or providing additional or improved plant, there is always an inclination not to interfere with the dividends, but to issue new shares. If the mining market is brisk, and if the directors are held in good esteem, owing to their successful management of the property, there is very little difficulty in raising the additional capital. If, however, the market is depressed, and the directors do not, for one reason or another, care to ask for subscriptions to new shares, then the extra expense is met out of revenue if possible. In other cases, when it is impossible to issue new shares and when there is not sufficient accumulated profit to meet the required expenditure, temporary loans against the ore reserves or against the general assets of the company are made by directors, shareholders, or others, and the loans afterwards paid off out of revenue.

Typical examples of the various methods of meeting extra expenditure may be given. The method of providing for it by the issue of new capital is well exemplified by the case of the various gold mining companies operating in the Kolar District of India, under the management of Messrs. John Taylor & Sons. Whenever money has been required for increasing the plant it has been raised by issuing new shares, although the mines at the time may have been yielding profits larger than the amount required. For instance, the Mysore Gold Mining Company has paid over three million pounds in dividends, but during its dividend-paying life, no less than £645,000 has been raised by the issue of new shares for the purpose of meeting expenditure on additional plant, on the general overhauling of property, and on sinking new shafts. The original capital of the company was £135,000, and at six different times new shares have been created of a nominal value of £122,500. As these shares were all issued at substantial premiums, the cash received amounted to £645,000, as above mentioned. In addition to these shares issued for cash, shares of a nominal value of £32,500 have been issued for the purchase of adjoining properties, so that the nominal capital of the company at the present time is £290,000. This policy has always been unanimously agreed to by shareholders in the Indian group, and as a matter of fact the new shares are usually absorbed by shareholders pro rata.

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Such a method of managing mining companies finances is illogical. Some part of the profits of each year's work should be devoted to the reduction of the capital account, and all expenditure subsequent to the initial cost of the property and equipment of the mine should be paid out of revenue. The method of reducing the value at which the property and original plant stands in the balance sheet would depend largely on circumstances. It might be agreed from the first that, say, one-fifth of the value should be written off every year, and when the total assets had thus been replaced by cash, there might be a return of capital. Another plan would be to have a re-valuation every year, and, if the value of the ore reserves was less than at the beginning, to replace the deficiency with cash from the year's profits.

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It is not often that a re-arrangement of the nominal capital of a mining company, so as to bring it nearer the real value of the property, takes place; as a rule, it only happens when a mine has become exceedingly prosperous and the dividends paid are so high that the market quotation for the shares is greatly enhanced. Then, for the purpose of facilitating market dealings, the nominal capital of the company is expanded so as to bring the current quotation nearer par. Recent examples of the capital being reduced, when it was found that the properties were nearing exhaustion, are to be found in the case of Mason & Barry, and the Mountain Copper Company. In the former case certain proportions of profits were distributed to shareholders, not as dividends, but in reduction of the capital, while in the case of the Mountain Copper Company, the company was reconstructed and the shares exchanged for debentures which are redeemable out of the profits.

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This subject is capable of considerable discussion, and I hope that your readers will contribute their opinions and experiences.

BENTONITE.

BY THOMAS T. READ.

In previous issues of this JOURNAL (LXIII, 600, and LXVI, 491) Dr. W. C. Knight has described the occurrence and composition of a peculiar clay, to which he gave the varietal name of Bentonite. Further study of the composition and possible uses of the clay seem to justify the publication of a few notes upon the subject at this time.

The type locality for Bentonite is Rock Creek, Albany County, Wyoming, where it was first named in 1888. It occurs here in a bed about 5 ft. thick in the Fort Benton shales. It appears to occur over an area of several square miles at this locality, from which the total production (1,200 tons in 1902) is mined. Three companies are actively engaged in exploiting it, and plan to increase their production largely this year. In addition to this type locality it occurs in Carbon, Natrona, Crook and Weston counties, and shows plainly the shore line at one period of the Fort Benton, occurring at various places along the old shore of which the Laramie Mountains were the height of land to the rear. The reason for this will be obvious when we come to consider its origin.

While possessing the usual physical properties of clays, Bentonite is especially remarkable for its great absorptive power. As usually occurring it contains from 15 to 20 per cent of water. According to experiments made by Dr. George P. Merrill, it absorbed so much water that it swelled to eight times its original volume, and this great amount of water was so perfectly held that none would run off when the flask was inverted. Naturally, it is extremely plastic.

By experiment in the chemical laboratory of the University of Wyoming it has been found that it will absorb more than twice as much glycerine as infusorial earth, thus indicating the possibility of its use as a dope for dynamite. It would probably not be as efficient, however, because of its lacking the porosity which causes each little diatom of the infusorial earth to act like a diminutive fire-cracker.

The chief use for the clay at present is for weighing and glazing paper. It is not entirely satisfactory for this purpose, however, as the ferrous salts present give a greenish tinge to the paper, which is undesirable. A more promising field for it is as a retarder for the hard-finish plaster (gypsum), used for finishing walls. None of the retarders now in use are at all satisfactory. Dr. E. E. Slosson, of the chemical department of the University of Wyoming, several years ago pointed out that Bentonite was admirably suited to this purpose, and proved it by experiment. The clay requires to be ground to a powder for this purpose, however, and it proved impossible to grind it on a commercial scale with any type or grinding machine in common use, as the powder agglomerates again if not removed as fast as made. Screening proved equally difficult. Both difficulties have been successfully solved in a new type of machine, and at present the clay bids fair to displace all other retarders. A third extensive use of the clay is as an adulterant in the manufacture of cheap candies, a use to which the total production of it for several years was put. As the clay is entirely innocuous and many of the other adulterants used in candy manufacture are not, it would seem that its use for this purpose is not entirely to be deplored.

In a smaller way it is used for a wide variety of purposes. Ground together with glycerine it forms the chief constituent of a patent preparation known as "phlogiston," which is widely used in this part of the West as a plaster for application to the chest, in cases of pneumonia and croup. It has no medicinal qualities, but acts only as a protective dressing. It is reported that a sanitarium is being erected for its use as a bath for the treatment of such diseases as mud baths are usually prescribed for. In veterinary practice it is unexcelled as a packing for horses' feet, and it is stated that it is the chief constituent of a brand of poultry-food which has an extensive sale. It was used as a soap in the Union Pacific Hotel at Rock Creek for a time, and the engineers of the Union Pacific used it extensively to cure hot boxes. The undecomposed particles of feldspar in it are soon fatal to the bearings, however, and its use for this purpose was prohibited by the management of the road.

In regard to its physical properties, the clay is extremely fine-grained, appearing under the microscope as consisting of extremely fine particles of regular outline, and almost uniform size. Dr. Merrill has advanced the hypothesis that its great plasticity and absorptive power are due, not to its chemical composition, but to the way in which these minute particles behave toward moisture.

Its specific gravity when air-dried is about 2.2; that of the clay as occurring in place varying widely, according to the amount of moisture it contains. In color it is usually pale greenish, due, most probably, to the ferrous oxide which is present, usually to the extent of two or three per cent.

Its origin and composition can best be studied in the light of each other. Upon careful examination of thin sections made from the clay we find here and there particles of undecomposed feldspar. By examination with high-power these uniformly prove to be labradorite. This then shows the error of the first writers in assuming the clay to be a variety of kaolin, as kaolin is typically regarded as resulting from the decomposition of orthoclase. On the other hand, the following analysis, when allowance is made for the difference in the percentage of water contained, is seen to agree almost exactly with the type analysis given for Montmorillonite (Dana 496). It would seem justifiable therefore to definitely assign this clay as a variety of Montmorillonite with the varietal name Bentonite, as previously given: SiO_2, 60.18 per cent; Al_2O_3 and Fe_2O_3, 26.58; CaO, 0.23; MgO, 1.01; Na_2O, 1.23; K_2O, 0; H_2O, 10.26; total, 99.49 per cent.

The analyses previously published of this clay seem to be largely in error as to exact composition of the clay itself, on account, doubtless, of the fact that it carried various impurities as it occurs naturally, such as gypsum, mirabelite and other of the salts occurring in our alkali region.

We may regard this clay as having been derived from the subaerial erosion of the anorthosites which occur extensively in the Archean core of the Laramie Mountains. The clays were laid down near the shore line, of which these mountains were the height of land.

On the whole, Bentonite promises to be one of the most valuable of all the clays. Its present price (about $7 per ton on board the cars) prevents those deposits which are not near railroad lines from being utilized, but when projected extensions of the various lines crossing the State are carried out, large amounts will become available.

ON ADOBE AND OTHER MAKESHIFT FURNACES.*

By Henry F. Collins.

The author disclaims any intention of recommending for permanent work such primitive appliances as those herein described. Cases, however, do occur when, for temporary purposes, it becomes advisable to make use of smelting processes in the absence of the more elaborate paraphernalia to which one is accustomed, and with no facilities except cheap native labor, and such local materials as common clay, stone, charcoal and brushwood. Such conditions are to be met with in out-of-the-way parts of Mexico and South America, India and Africa.

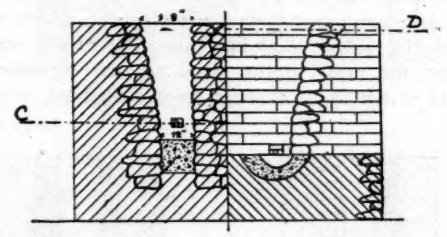


FIG. 1.—Sectional Elevation on line A B.

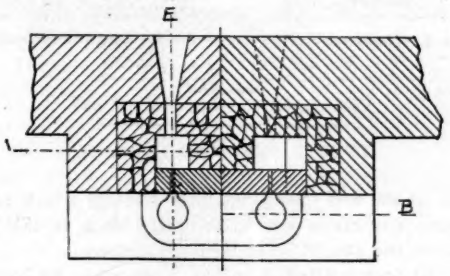


FIG. 2.—Sectional Plan on line C D.

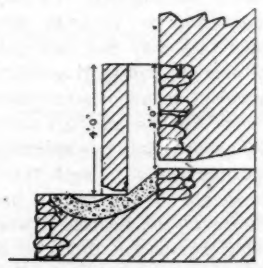
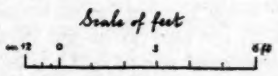


FIG. 3.—Transverse Section on E F.



LEAD SMELTING FURNACE—

Adobes, the most convenient material for these rude furnaces, are simply sun-dried bricks; the dimensions vary in different districts, particularly the thickness; but an average size, throughout Mexico, may be put at 18½ by 9 by 4 in., and this will be found a very convenient size for furnace building. Special *adobes* for the roof of *vasos* (cupellation hearths) are often made 30 by 12 by 4 in.

The material is not a pure clay, which would shrink too much in drying, but any kind of loamy clay or alluvial surface soil, provided it is not too sandy, calcareous, or full of peaty matter. In dry climates there can be found almost everywhere, below the alluvial loams in the river valleys, and below the friable surface soil of the cultivable plains, a layer of clayey subsoil which is suitable for the manufacture of *adobes*. If too stiff, sand or surface loam must be added, if too sandy, the resulting *adobes* are very friable; but almost any kind of mud will make *adobes* of sorts. The presence of a considerable amount of small stones is no disadvantage, the larger stones being picked out in the process of treading. A certain proportion of chopped straw is necessary to make *adobes* which will stand handling; about one two-bushel sackful to a cubic yard of clay is a good proportion, but less is frequently employed when straw is scarce. The author has found naturally dried prairie grass to be a fair substitute for straw, but it should be chopped to about 1½ in. lengths, and used in about double the above proportions.

The clay is generally broken up with hoes, sufficient water is added, and it is moderately well mixed by treading to a stiff mud, close to the spot where it is dug. The mud is carried in hand-barrows or shallow trays to the spot where the bricks are to be made. This is a flat smooth piece of ground, as near as possible to the clay pit, upon which the *adobero* lays his moulds, well sanded before being filled with the mud, which is then well pushed with the fist into all the corners of the mould. In the dry season the drying ground need not be covered; in order to make *adobes* all the year round, however, some kind of a thatched or other roof is, of course, necessary. When nearly dry, or after, say, from ten days to three weeks, according to the season, the bricks are turned over, and when quite dry they are removed and stacked, and they improve by keeping. Nothing but clay or mud mortar is ever used.

The broad distinction to be made in treating of cheap make-shift furnaces is between blast-furnaces for which charcoal is required and reverberatories for none of which is any other fuel necessary beyond local firewood, or even the simplest kind of brushwood in quite small twigs. For blast-furnace smelting some kind of sandstone or other refractory lining is essential if the smelting campaign is to last more than a very few days, and if good stone be common and clay scarce the whole furnace may be built of stone. The necessity of securing a supply of charcoal causes great difficulty in extending the scale of working in some arid districts; while if a sufficient supply of this fuel can be assured, it will almost always be worth while for anything like permanent work to put up much larger furnaces, either of local stone or of brick roughly burned on the spot in an improvised kiln.

FURNACES REQUIRING CHARCOAL FUEL.

Silver-lead Smelting in Blast-furnaces.—R. E. Chism gives[1] a good description of the small blast-furnaces formerly in use at Sierra Mojada, Mexico. Similar furnaces have been seen at work by the author at Sta. Eulalia and other places in Chihuahua, at Guadalcazar (San Luis Potosi) and elsewhere, and their construction is shown in Figs. 1, 2 and 3. They are almost invariably built in pairs under a vaulted roof, 30 to 40 ft. high, like that of the mediaeval kitchens, which serves to carry away all fumes and products of combustion. Generally, though not invariably, they are lined on the back and sides with sandstone, trachyte, porphyry, or other refractory stone; the front wall, however, is almost always built of *adobes*, placed longitudinally; that is, 9 in. thick. The crucible of the furnace

* Abstracted from *Proceedings* of the Institution of Mining and Metallurgy, London, June, 1903.

[1] *Transactions* of the American Institute of Mining Engineers, vol. xv, p. 556.

THE PAYMENT OF EXTENSIONS OF MINING PLANT OUT OF REVENUE.

BY OUR LONDON CORRESPONDENT.

In a recent London letter I referred to the principle laid down by Mr. C. Algernon Moreing at the meeting of shareholders of Great Fingall Consolidated, that all expenditure on development of a mine and extensions of metallurgical plant should be paid for whenever possible out of revenue. The question before the shareholders was whether the new plant should be paid for by additional capital raised by the issue of new shares or whether the large balance of divisible profit (some £100,000) should be devoted to that purpose.

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While possessing the usual physical properties of clays, Bentonite is especially remarkable for its great absorptive power. As usually occurring it contains from 15 to 20 per cent of water. According to experiments made by Dr. George P. Merrill, it absorbed so much water that it swelled to eight times its original volume, and this great amount of water was so perfectly held that none would run off when the flask was inverted. Naturally, it is extremely plastic.

By experiment in the chemical laboratory of the University of Wyoming it has been found that it will absorb more than twice as much glycerine as infusorial earth, thus indicating the possibility of its use as a dope for dynamite. It would probably not be as efficient, however, because of its lacking the porosity which causes each little diatom of the infusorial earth to act like a diminutive fire-cracker.

The chief use for the clay at present is for weighing and glazing paper. It is not entirely satisfactory for this purpose, however, as the ferrous salts present give a greenish tinge to the paper, which is undesirable. A more promising field for it is as a retarder for the hard-finish plaster (gypsum), used for finishing walls. None of the retarders now in use are at all satisfactory. Dr. E. E. Slosson, of the chemical department of the University of Wyoming, several years ago pointed out that Bentonite was admirably suited to this purpose, and proved it by experiment. The clay requires to be ground to a powder for this purpose, however, and it proved impossible to grind it on a commercial scale with any type or grinding machine in common use, as the powder agglomerates again if not removed as fast as made. Screening proved equally difficult. Both difficulties have been successfully solved in a new type of machine, and at present the clay bids fair to displace all other retarders. A third extensive use of the clay is as an adulterant in the manufacture of cheap candies, a use to which the total production of it for several years was put. As the clay is entirely innocuous and many of the other adulterants used in candy manufacture are not, it would seem that its use for this purpose is not entirely to be deplored.

In a smaller way it is used for a wide variety of purposes. Ground together with glycerine it forms the chief constituent of a patent preparation known as "phlogiston," which is widely used in this part of the West as a plaster for application to the chest, in cases of pneumonia and croup. It has no medicinal qualities, but acts only as a protective dressing. It is reported that a sanitarium is being erected for its use as a bath for the treatment of such diseases as mud baths are usually prescribed for. In veterinary practice it is unexcelled as a packing for horses' feet, and it is stated that it is the chief constituent of a brand of poultry-food which has an extensive sale. It was used as a soap in the Union Pacific Hotel at Rock Creek for a time, and the engineers of the Union Pacific used it extensively to cure hot boxes. The undecomposed particles of feldspar in it are soon fatal to the bearings, however, and its use for this purpose was prohibited by the management of the road.

In regard to its physical properties, the clay is extremely fine-grained, appearing under the microscope as consisting of extremely fine particles of regular outline, and almost uniform size. Dr. Merrill has advanced the hypothesis that its great plasticity and absorptive power are due, not to its chemical composition, but to the way in which these minute particles behave toward moisture.

Its specific gravity when air-dried is about 2.2; that of the clay as occurring in place varying widely, according to the amount of moisture it contains. In color it is usually pale greenish, due, most probably, to the ferrous oxide which is present, usually to the extent of two or three per cent.

Its origin and composition can best be studied in the light of each other. Upon careful examination of thin sections made from the clay we find here and there particles of undecomposed feldspar. By examination with high-power these uniformly prove to be labradorite. This then shows the error of the first writers in assuming the clay to be a variety of kaolin, as kaolin is typically regarded as resulting from the decomposition of orthoclase. On the other hand, the following analysis, when allowance is made for the difference in the percentage of water contained, is seen to agree almost exactly with the type analysis given for Montmorillonite (Dana 496). It would seem justifiable therefore to definitely assign this clay as a variety of Montmorillonite with the varietal name Bentonite, as previously given: SiO_2, 60.18 per cent; Al_2O_3 and Fe_2O_3, 26.58; CaO, 0.23; MgO, 1.01; Na_2O, 1.23; K_2O, 0; H_2O, 10.26; total, 99.49 per cent.

The analyses previously published of this clay seem to be largely in error as to exact composition of the clay itself, on account, doubtless, of the fact that it carried various impurities as it occurs naturally, such as gypsum, mirabelite and other of the salts occurring in our alkali region.

We may regard this clay as having been derived from the subaerial erosion of the anorthosites which occur extensively in the Archean core of the Laramie Mountains. The clays were laid down near the shore line, of which these mountains were the height of land.

On the whole, Bentonite promises to be one of the most valuable of all the clays. Its present price (about $7 per ton on board the cars) prevents those deposits which are not near railroad lines from being utilized, but when projected extensions of the various lines crossing the State are carried out, large amounts will become available.

ON ADOBE AND OTHER MAKESHIFT FURNACES.*

By HENRY F. COLLINS.

The author disclaims any intention of recommending for permanent work such primitive appliances as those herein described. Cases, however, do occur when, for temporary purposes, it becomes advisable to make use of smelting processes in the absence of the more elaborate paraphernalia to which one is accustomed, and with no facilities except cheap native labor, and such local materials as common clay, stone, charcoal and brushwood. Such conditions are to be met with in out-of-the-way parts of Mexico and South America, India and Africa.

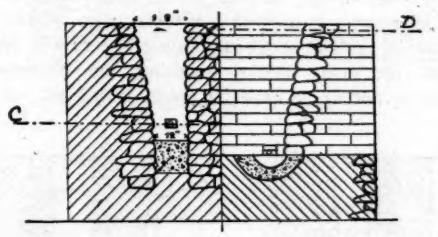


FIG. 1.—Sectional Elevation on line A B.

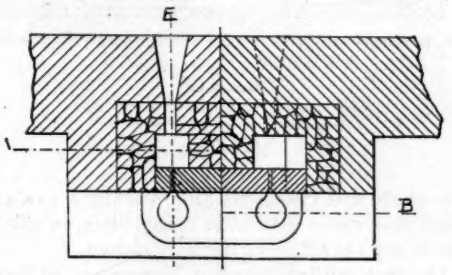


FIG. 2.—Sectional Plan on line C D.

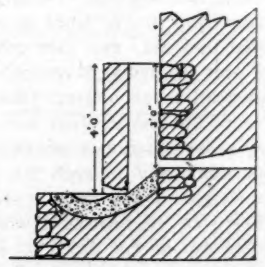
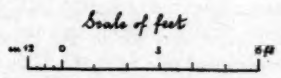


FIG. 3.—Transverse Section on E F.



LEAD SMELTING FURNACE—

Adobes, the most convenient material for these rude furnaces, are simply sun-dried bricks; the dimensions vary in different districts, particularly the thickness; but an average size, throughout Mexico, may be put at 18½ by 9 by 4 in., and this will be found a very convenient size for furnace building. Special *adobes* for the roof of *vasos* (cupellation hearths) are often made 30 by 12 by 4 in.

The material is not a pure clay, which would shrink too much in drying, but any kind of loamy clay or alluvial surface soil, provided it is not too sandy, calcareous, or full of peaty matter. In dry climates there can be found almost everywhere, below the alluvial loams in the river valleys, and below the friable surface soil of the cultivable plains, a layer of clayey subsoil which is suitable for the manufacture of *adobes*. If too stiff, sand or surface loam must be added, if too sandy, the resulting *adobes* are very friable; but almost any kind of mud will make *adobes* of sorts. The presence of a considerable amount of small stones is no disadvantage, the larger stones being picked out in the process of treading. A certain proportion of chopped straw is necessary to make *adobes* which will stand handling; about one two-bushel sackful to a cubic yard of clay is a good proportion, but less is frequently employed when straw is scarce. The author has found naturally dried prairie grass to be a fair substitute for straw, but it should be chopped to about 1½ in. lengths, and used in about double the above proportions.

The clay is generally broken up with hoes, sufficient water is added, and it is moderately well mixed by treading to a stiff mud, close to the spot where it is dug. The mud is carried in hand-barrows or shallow trays to the spot where the bricks are to be made. This is a flat smooth piece of ground, as near as possible to the clay pit, upon which the *adobero* lays his moulds, well sanded before being filled with the mud, which is then well pushed with the fist into all the corners of the mould. In the dry season the drying ground need not be covered; in order to make *adobes* all the year round, however, some kind of a thatched or other roof is, of course, necessary. When nearly dry, or after, say, from ten days to three weeks, according to the season, the bricks are turned over, and when quite dry they are removed and stacked, and they improve by keeping. Nothing but clay or mud mortar is ever used.

The broad distinction to be made in treating of cheap make-shift furnaces is between blast-furnaces for which charcoal is required and reverberatories for none of which is any other fuel necessary beyond local firewood, or even the simplest kind of brushwood in quite small twigs. For blast-furnace smelting some kind of sandstone or other refractory lining is essential if the smelting campaign is to last more than a very few days, and if good stone be common and clay scarce the whole furnace may be built of stone. The necessity of securing a supply of charcoal causes great difficulty in extending the scale of working in some arid districts; while if a sufficient supply of this fuel can be assured, it will almost always be worth while for anything like permanent work to put up much larger furnaces, either of local stone or of brick roughly burned on the spot in an improvised kiln.

FURNACES REQUIRING CHARCOAL FUEL.

Silver-lead Smelting in Blast-furnaces.—R. E. Chism gives[1] a good description of the small blast-furnaces formerly in use at Sierra Mojada, Mexico. Similar furnaces have been seen at work by the author at Sta. Eulalia and other places in Chihuahua, at Guadalcazar (San Luis Potosi) and elsewhere, and their construction is shown in Figs. 1, 2 and 3. They are almost invariably built in pairs under a vaulted roof, 30 to 40 ft. high, like that of the mediaeval kitchens, which serves to carry away all fumes and products of combustion. Generally, though not invariably, they are lined on the back and sides with sandstone, trachyte, porphyry, or other refractory stone; the front wall, however, is almost always built of *adobes*, placed longitudinally; that is, 9 in. thick. The crucible of the furnace

* Abstracted from *Proceedings* of the Institution of Mining and Metallurgy, London, June, 1903.

[1] *Transactions* of the American Institute of Mining Engineers, vol. xv, p. 556.

slopes to the front wall, and, together with the tap-pit in front, on a bench consisting of a wall of stone or brick filled in with rammed earth, is made of a layer of brasque composed of equal parts of charcoal dust and the most refractory clay obtainable, well tamped in a layer about 6 ins. deep. There is one tuyere in the back, about 1 in. in diameter, which enters the wall either through a hole drilled in a large block of porphyry, through a large plate of copper, perhaps 18 ins. square and 2 ins. thick, or, in small temporary furnaces, through the clay mortar at the common angle of four large stones. In one case the author saw a small water-back which had been taken from a smith's forge, fitted into a small arch built in the back wall of the furnace. The blast is generally produced by an ordinary pair of forge bellows of large size, but where there are several furnaces, mule-power is sometimes employed to give motion to a fan-blower, by means of a suitable horse-power gearing multiplied by an arrangement of home-made wooden pulleys. Where water-power is available, a small overshot wheel is made to operate a fan.

The ores smelted in these furnaces must be ferruginous and self-fluxing, and if they are not already rich in lead (30 per cent or upwards) litharge (*greta*) must be added to the charge. When rich, "dry," or zincy ores are treated, the proportion of litharge will reach an equal weight to that of the ore. Rich galena or lead carbonate ores, of course, require no litharge, but the former sometimes produce a small amount of matte (*fierro*), which has to be added to the charge. The ore, together with its required amount of litharge, is weighed out in charges of about 150 lb. each, and an equal weight of slag, from a previous operation, is added. The two are then mixed and called a charge (*revoltura*), which, however, is not fed into the furnace all at once, but is added, a small trayful at a time, by a boy who steps up onto the bench in front of the furnace with a tray upon his head and empties it into the open top of the furnace. The fuel usually is not weighed at all, trayfuls of charcoal and charge of about equal bulk are fed into the furnace alternately, the consumption by weight working out at about one-third of the total weight of charge, or two-thirds of the weight of ore smelted. The charcoal used is chiefly oak and mezquite, pine charcoal being of inferior quality. The furnace is run with a moderately cool top, and the fused products run continuously through a tap-hole into the basin in front of each furnace, where they separate; the slag is lifted off in cakes as it cools, and the lead is either tapped at intervals from the basins or sometimes ladled into rough stone moulds.

The quantity of average leady ore of, say, 30 to 40 per cent, treated in such a furnace per 24 hours, will vary from 1.25 to 1.50 tons. Two men and a boy are required on each 12-hour shift, apart from those required for the bellows, if the blowing is done by man power.

The cost of smelting will vary largely, according to the price of charcoal, but (disregarding the cost of litharge, which is a by-product of the cupellation) the total cost may range, with cheap labor, from, say, $10 per ton, when power is available for producing the blast, to from $15 to $18, when the bellows are blown by manual labor. Mexican smelters reckon, as a rule, that ores running under 20 oz. per ton are hardly worth smelting, which indicates that the average cost, including superintendence and repairs, cannot be far from the highest figure mentioned.

The loss in smelting is considerable, both by volatilization and in slags, although, curiously, in the latter there is, as a rule, but little combined lead, and most of that present is in the form of shots and occasional fair-sized pieces. In some cases where water power is available it has paid to stamp and concentrate these slags. They vary a good deal in composition, though always ferruginous, and, apart from shots, may average 2 to 3 per cent lead and 1.5 to 2.5 oz. silver. An average grade of the ore mixture treated, taking one district with another, may be, perhaps, 60 to 70 oz. silver per ton, the lead in the ore varying from almost nothing up to 70 per cent, while the average yield of the smelting charge is adjusted by adding litharge when the ore is "dry," so as to be never less than about 30 per cent of the weight of the charge.

Copper Smelting in Blast-furnaces.—Before the opening up of the country by means of railways, in many parts of Mexico, notably in Michoacan and Chihuahua, copper was smelted direct to metal from oxidized (carbonate) ores in furnaces similar to those already described. The author has seen the process in operation about ten years ago at Magistral, in the State of Chihuahua. The furnaces employed have a general resemblance to that shown in Figs. 1, 2 and 3, but, instead of being built in pairs, each stands by itself, forming a square block about 6 ft. in the side and a little over that in height. Figs. 4 and 5 show the furnace in section, respectively from front to back and transversely. The one tuyere at the back is a block of copper, cast in a suitable clay mould direct from the furnace itself, and weighing about 400 lb. In it there is inserted an iron pipe connected by a leathern hose with the forge bellows, an immense double-acting affair, some 8 ft. long, worked, through an arrangement of levers, by four boys on each 12-hour shift, who relieve each other in pairs at short intervals. The tuyere usually lasts for many weeks' smelting, but occasionally gets so hot as to have its point melted off, so that

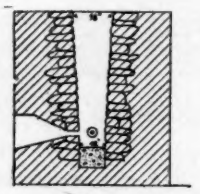


FIG. 4.—Transverse Section.

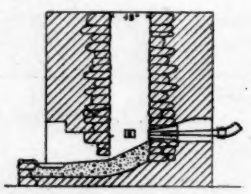
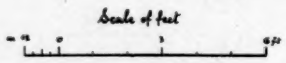


FIG. 5.—Longitudinal Section.



COPPER SMELTING FURNACE.

one of the first operations after starting a new campaign is to cast a new spare tuyere block, in case the one in use should be accidentally melted.

The ores smelted in such a furnace are, of course, self-fluxing carbonates with sufficient iron and lime to make an easily smelted slag. Usually ores of different character from two or more mines are mixed together so that they may flux each other. The average yield of ores smelted at Magistral was about 13 per cent, equivalent to an original tenor of perhaps 16 per cent, since the loss in slags will average over 3 per cent. The ore-charge is mixed by weight in suitable proportions, and to each 600-lb. weight is added 450-lb. weight of slag from a previous operation; when, however, the furnace is working hot, the addition of slag can be cut down to 400 lb.

Each charge of slag and ore is well mixed, and is fed into the furnace by trayfuls alternating with trayfuls of charcoal. The latter is weighed out, generally 300 lb. being allowed for each charge. (*revoltura*) of 600 lb. ore plus 460 to 450 lb. slag, so that, as each little weighed pile of fuel has to suffice for a charge any little inequalities in the feed are corrected in the course of a couple of hours. When the furnace is running well on fusible ores, the fuel charge can be cut down to 250 lb. (equals 41 per cent of the weight of ore smelted, or 25 per cent of the weight of ore and slag), but when it is running badly the quantity will need to be augmented to 350 lb. (equals 58 pr cent of the weight of ore smelted), so that 50 per cent will be a fair average. The best fuel is a mixture of pine and mezquite charcoal, as that made from oak breaks up and makes too much fines. Each furnace requires on each shift, besides the four men at the bellows, a smelter (*fundidor*) and a feeder (*carguero*). The rates were, at Magistral, in 1891, for smelters, $1.25; feeders, 75c., and bellow boys, 32c., the daily pay-roll for each furnace amounted to $6.25, which on a daily smelting capacity of 7,500 lb. ore, is equivalent to about $1.87 per ton. The principal item of cost is, of course, the fuel. At Magistral, by choosing only suitable seasons of the year, charcoal could be obtained at 50c. per quintal ($16.80 per ton). The actual cost of a 26 days' campaign in one furnace during the year 1891, in the course of which 86 tons were smelted, was as follows:

	Mexican silver. Total.	Per ton.
Wages, 26 days, at $6.25	$162.50	$1.89
Furnace repairs	36.81	0.43
46½ tons charcoal at $11.20	521.50	6.06
Total	$720.87	$8.38

In these figures nothing is allowed for supervision, which on a single furnace might be reckoned at from 75c. to $1 per ton, and fuel was unusually cheap. Still almost anywhere in the central plateau district of Mexico charcoal can be obtained in moderate quantities for $16 to $18 per ton, and the average wages paid will not exceed the above estimate by more than 50 per cent, so that the average smelting cost for self-fluxing carbonate ores of this description containing upwards of 15 per cent copper may be safely reckoned at not over $14 or $15 per ton.

The loss of copper in slags is considerable, for, owing to their low degree of fluidity and to the high melting point of copper, not less than 3 to 5 per cent of metallic copper will be found entangled in them in the form of shots. In addition the combined copper is about 2 per cent, so that the total contents of the slags will range from 5 up to 7 per cent of copper.

In some places near the railroad, coke has been used in these native furnaces to replace part of the charcoal with very good results; the furnace capacity is much increased, but the cost of coke is so much higher as to discount its greater efficiency, and so do away with the economy.

FURNACES REQUIRING ONLY BRUSHWOOD AS FUEL.

Roasting Reverberatories.—In many parts of Mexico, *adobe* furnaces are used on quite a large scale for the roasting of ores, both for chloridizing roasting preparatory to lixiviation, and for ordinary roasting before blast-furnace smelting.

At Sombrerete, until recently, there were in use no less than twelve large roasting furnaces, each 30 ft. long by 10 ft. wide, with only one set of doors along one of the long sides and arranged in pairs back to back so as to utilize one set of tie-rods for both furnaces.

At Yedras[2] eight furnaces of this same type in pairs back to back, each 48 ft. long by 10 ft. wide, were until recently in use for chlorination roasting.

At San Luis Potosi there are ten pairs of furnaces, used for roasting sulphide ores for blast-furnace smelting. Each furnace measures 60 ft. by 11 ft. inside, and is wholly of *adobe*, with the exception of the fore-box, which is of fire-brick; and the hearth, which is of ordinary red brick. The *adobes* are of ordinary size, and the cooler part of the furnace stands nearly as well as if made of brick; at the fire-box end, however, repairs are somewhat extensive. The idea hitherto has been that *adobe* arches would not stand when over 11 ft. wide; but some new furnaces are to be built 15 ft. wide, which will admit of doing away with the central division between the pair of furnaces, and of placing working doors on both sides of the hearth. This so much facilitates the work of rabbling, and moving forward the charges, as to virtually increase the hearth efficiency of the furnace.

The ores roasted in these furnaces average about 18 to 20 per cent of sulphur, which is reduced to 4.5 per cent after roasting. The fuel is ordinary hard scrub oak, of good quality, the consumption of which is about one-third of the weight of ore roasted.

Sections of these furnaces are not given here, because they differ in no essential respect from the reverberatories used at most smelting works, except

[2] Clemes, *Proceedings* of the Institution of Civil Engineers, vol. cxxv, p. 95.

as regards the material of which they are constructed. In the paper already referred to, drawings of the furnaces at Yedras are given by Clemes.

For temporary purposes, or where regularity of operation was not essential, in the absence of firebrick, such furnaces could be built wholly of *adobe*, except the hearth, since even the fire-box would last a few weeks, and, when burned out, could be easily torn down and rebuilt, without interfering with the rest of the furnace. *Adobes* would not serve for the hearth, as the wear and tear due to the rabbling would be too great, and it would be best to burn a small quantity of red brick in some improvised kiln for this purpose.

Reverberatory Smelting Furnaces.—These, if of refractory stone, may be built of almost any required size, but if made of *adobe* it must not be more than about 6 ft. wide, as a wider arch in that material will not stand the more intense heat of smelting. As a rule, 5 ft. will be found the best width, because both the arch and the hearth give out very soon if made wider.

Figs. 6, 7 and 8 show a furnace of this kind, the hearth of which, measuring 7 ft. 6 in. long and 5 ft. wide, slopes from both ends towards the middle, and from the charging and skimming door towards the taphole. The working hearth is formed of a layer of two parts sand and one part clay intimately mixed and beaten in upon the lower hearth built of *adobes* on edge. The arch rises 9 ft. in the span of 5 ft., and is built of *adobes* on edge by means of a rough center of sand formed to the required shape, which is afterwards removed through the working door when the keying of the arch is completed. No door-frame is used, but a couple of pieces of heavy iron are, if obtainable, carried over the working door to support the *adobe* skewback. The firebars are *adobes* of extra size, say, 30 by 12 by 4 ins., placed edgeways, with their upper surface 18 ins. below the bridge, so as to allow room for a sufficiently deep bed of the brushwood which is employed as fuel. There is a small door below the firebars for removal of ashes. No buckstaves or tie-rods are usually employed, the thrust of the arch being supported only by the buttresses at the corners of the furnace. In some cases, however, a heavy plank, laid along the skewbacks and supported by pole struts, is employed to give additional strength, and a couple of light rails laid along the skewbacks will lengthen the life of the arch. However supported, an *adobe* arch never lasts very long, and it is cheaper to tear down and rebuild, than to attempt repairing it. Both the arch and the furnace itself, or at least its lining and that of the firebox, may be built of refractory stone, such as sandstone or trachyte; but although the use of stone is advantageous as regards the firebox, firebridge, etc., the additional labor involved in cutting it to shape offsets any advantage of longer life as regards the arch.

When used for smelting high-grade silver-lead ores, after thoroughly drying out and warming up the furnace during two or three days, a couple of charges of poor litharge are first smelted down and reduced with a few shovelfuls of charcoal, in order to consolidate and saturate the sand bottom. The ore-charge is then thrown in through the working door, spread out, roasted for a time at a low heat, and then run down by reaction. If lead ores only are being smelted, the lead is tapped as it forms, and slag removed through the working door only, when, after several ore-charges have been worked off, the consequent accumulation of slags fails to yield any more lead to vigorous rabbling at a high temperature. When dry silver ores are to be treated, a bath of lead is first accumulated and the rich ore is then thrown in through the working door, a shovelful at a time, no more being added until the previous addition has been completely slagged and its metallic contents have entered the bath. The lead is tapped into moulds of any convenient size, often formed in a pile of clay and wood ashes outside the tapping spout, though sometimes stone moulds are used, cut out of some soft volcanic rock.

The slags made run very high in lead, generally from 30 to 50 per cent of lead oxide, and they often contain prills of lead; but apart from these, which contain the same proportion of silver as the bullion made at that time, the slags run comparatively low in that metal, generally only 2 to 3 oz. per ton from leady ores alone, although imperfectly fused portions produced when smelting dry ores often run very much higher. On account of their lead contents, large quantities of slags made in furnaces of this class have been subsequently run down in blast-furnaces like those shown in Figs. 1 to 3, being utilized both as flux and as a source of lead when smelting mixtures of silver and lead ores.

The cost of smelting in these furnaces will vary chiefly with the cost of fuel, which is the principal item. As a rule, brushwood of any available kind is employed, cut by native boys and brought in on pack animals to the doors of the furnace; its cost may be anywhere from 10c. up to 40c. per *carga* of 300

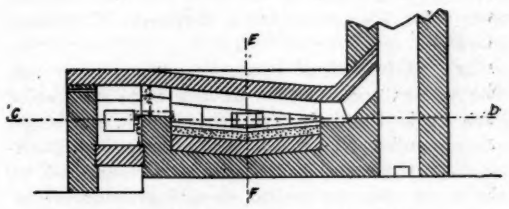


FIG. 6.—Longitudinal Section on A B.

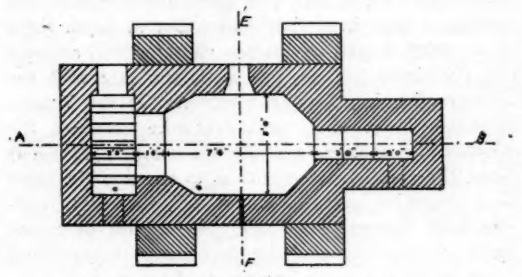


FIG. 7.—Horizontal Section on C D.

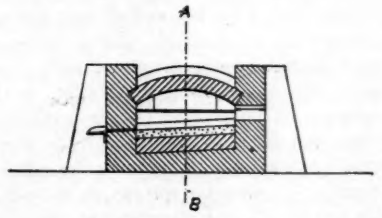
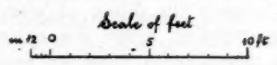


FIG. 8.—Transverse Section on E F.



REVERBERATORY SMELTING FURNACE.

lb. It takes from 3 to 6 *cargas* of brushwood to smelt a cargo of ore, according to the fusibility of the latter, and to the quality of the brushwood. Taking average figures of, say, 25c. per *carga*, for pretty good dry brushwood, and 4 *cargas* of it for every ton of ore smelted, the cost for fuel alone will amount to about $7.50 per ton smelted. Each furnace requires usually two men on each shift, costing respectively, say, $1.25 to 75c., making a total bill for labor of $2 per shift. The quantity of ore smelted in such a furnace will vary according to its fusibility and tenor in lead, as well as according to the class of fuel available, but usually a charge of two *cargas* or 600 lb., will be melted down in from 3 to 4 hours, making 6 to 8 *cargas*, or somewhere about 1 ton per 12-hour shift. With very rich fusible lead ores and good oak fuel, nearly double this quantity can be treated. In addition to the cost for fuel and labor, at least $2 per ton should be added to cover superintendence, incidentals and furnace repairs, which are extensive and a constantly recurring expense. The total cost per ton smelted may therefore vary between the extreme limits of $8 and $15, an average figure being, say, $11 to $12 for what may be considered normal conditions.

(To be continued.)

COAL MINING IN OHIO.

The preliminary report of State Mine Inspector G. E. Billison shows that the total coal mined in the State of Ohio in the year 1902 was 23,926,267 tons; a gain of 3,607,477 tons, or 17.8 per cent, over the output for 1901. Production last year was stimulated by the shortage of anthracite, as well as by the demands of an active manufacturing industry. On the other hand, operations were restricted at many mines by the failure of the railroads to furnish transportation for the coal as fast as it was needed. The large production in 1902 probably puts Ohio third on the list of coal-producing States for the year. Its output was exceeded by that of Pennsylvania and Illinois only; in 1901 it stood fourth, being passed by West Virginia also.

In 1902 coal was mined in 30 counties of the State. The total number of mines, or openings, reported to the inspector was 967; of which 906 were in operation, 61 being in throughout the year. Probably most of these are exhausted.

Of the different sections of the State, Athens County ranks first as a coal producing county, the entire output amounting 3,666,993 tons; this is a gain of 600,460 tons over the output for 1903. Guernsey County ranks second in point of production reporting a total tonnage of 2,968,108 tons, a gain of 875,221. Perry County, which in 1901 ranked second, dropped to third position in point of production, having an output of 2,830,962; however, there was a gain of 267,911 over the preceding year. Jackson County, a former noted coal producer, occupies fourth place in the amount of coal produced, reporting a total of 2,316,123 tons mined. The gain over 1901 was 174,657. Hocking dropped from third place to fifth, producing 2,118,805 tons, which was a loss of 230,064. Belmont County is sixth in point of production, mining 2,058,066 tons, a gain of 513,214 tons. One county produced over three millions, and five over two millions. Gains occur in 21 counties, and losses in nine. The Hocking Valley District, which is composed of the counties of Hocking, Athens and Perry, produced 8,616,760 tons, or 37.7 per cent, of the entire output of the State. This is a gain of 638,327 tons, as compared with the year 1901.

The total number of persons employed in coal mining was 37,421, of whom 27,613 are classed as miners, and 9,808 as day hands or laborers. This shows an average of 639 tons per employee, or 866 tons per miner. The average time worked for all the mines was 176.4 days during the year.

There were 141 mines in the State, in which machines were in use. The total coal mined by machine was 13,439,648 tons, or 56.2 per cent of the total. These figures show that machine mining has a stronger hold in Ohio than in any other State; also that it is in the larger mines where machines are used. The number of machines of all kinds at work last year was 574, an increase of 145 over 1901. These required 1,418 machine-runners and 11,889 helpers, laborers, and other assistants.

The accident report shows the following statement of persons killed and injured in Ohio mines during the year:

Results:	Number.	Per 1,000 employees.	Per 1,000 days' work.
Killed	81	2.16	0.012
Seriously injured	298	7.96	0.045
Slightly injured	153	4.09	0.023
Total injured	451	12.05	0.068
Total	532	14.21	0.080

The number per 1,000 days' work is, of course, an approximation, based on the average term of operation in the mines, which is given above.

In addition to the coal mined in Ohio, there were 10,681 tons of iron ore produced, and 1,528,829 tons of fireclay. The mining of iron ore in the State has fallen to a very low point.

HOT SPRINGS.*

By Edouard Suess.

Leaving the question of volcanoes and eruptive springs for the present, I will next consider the second class of springs, those found in the old granitic and sedimentary regions and constituting the larger proportion of European medicinal springs. In 1847 Elie de Beaumont stated that "Mineral springs usually occur in groups, with one or more principal outflows, and they may be regarded as volcanoes that have lost their power to carry anything but gaseous emanations, which in most cases reach the surface in the form of mineral or thermal waters."[5] The moderate temperatures that obtain in such springs, and the remoteness from active volcanoes have given an incentive to those who would explain thermal waters as due to vadose infiltration and hydrostatic pressure. Daubree, especially, carried out a very ingenious experiment in support of this hypothesis.[6] In the Erzgebirge, however, we may get a more satisfactory explanation of the questions raised, for nature here has revealed her processes so clearly that they cannot be mistaken.

The Erzgebirge, to which by structure the Carlsbad granite belongs, is intersected by numerous fissures that have been filled with quartz and various ores. The structure of these fissure veins has been thoroughly studied by the members of the famous Freiberg School, one of whom, Hermann Muller, more than 40 years ago recognized the important bearing which mineral veins have upon the questions now under discussion, and published a paper entitled "Ueber die Beziehungen zwischen Mineralquellen und Erzgangen im nordlichen Bohmen und Sachsen."

Inasmuch as the hottest fumaroles are dry, the material deposited by them must be in the nature of sublimation products. The younger fumaroles, including those carrying sulphides, are accompanied by aqueous vapors and their deposits have a banded or zonal structure, owing to the arrangement of the material in successive layers. In this connection let us consider a few actual examples. The deposits of tin—such as those of Schlackenwald, Altenberg, Zinnwald and Cornwall—have been produced by sublimation; very rarely can any indications of thermal spring formation be observed. Daubree has shown that they have been formed by gaseous emanations of fluorine, chlorine and boron, which are similar to the dry vapors given off by hot fumaroles at the present time. The tin deposits of the Erzgebirge are limited to the upper portion of the granitic mass, and are accompanied by fluorspar, topaz, tourmaline and dark mica. In a number of places the sublimations have penetrated the formations adjacent to the granite. The depth to which the deposits extend does not exceed a few hundred meters; below this level the deposits are usually barren, although in some mines they give way to sulphides, especially chalcopyrite, zinc-blende and arsenical pyrites, so that miners speak of a "tin hat" covering deposits of sulphides.

Tin deposits are indicative, therefore, of the hottest fumaroles whose temperatures exceed those found in thermal and sulphide phases of ore-formation. In contrast with this fumarole activity are the thermal waters which represent the latest phase in the long series of processes that give rise to ore-bodies, and which have been encountered in several mine workings. In the Einigkeits shaft of Joachimsthal, a spring with a temperature of 28.7° C. was encountered in 1864. Waters of from 20° to 25° have been struck quite often in the Saxon mines, and even pulsating springs and free carbon dioxide have been found. The larger number of these springs are alkaline, frequently containing considerable amounts of sodium chloride. The presence of salt in the Carlsbad springs is remarkable, inasmuch as they are enclosed in granite. A salt spring, which was struck in an old copper and lead mine in graywacke near Altensalza, was utilized during the 17th and 18th centuries for the manufacture of salt. The alkalies, owing to their marked solubility, are not deposited during the formation of the ore deposits.[7]

Two extremes are thus observable in the formation of ore-bodies; on the one side the fumaroles with temperatures above 500° C., whose effects are illustrated by the "tin hat," on the other side the tepid alkaline springs. Vadose circulations are present, naturally, in the upper horizon, but they are of minor importance. The alkaline springs encountered in mines are only the last stage of a series of processes originating in the earth's interior, and despite their low temperature they are of juvenile character.

Carlsbad is situated upon the outcrop of a vein. The springs occur within an area measuring about 1,800 m. in length by 150 m. in width, the longer axis extending N. 34° W. If the superficial covering which obstructs our view were removed we would see that the system of springs with the accompanying mineral deposits cut straight through two kinds of granite. For some distance from the surface a deposit of lime exists, but in depth there is an older deposit of quartz (chert) which cements the brecciated granite, just as is the case with the closely related springs of Plombieres in the Vosges. Veins of both chert and aragonite intersect the neighboring granite, and the observations of Knett leave the question undecided as to whether the chert and aragonite have been deposited alternately during brief successive periods. Weed[8] has described such an alternation in the deposition of cementing material in a granite breccia at the hot springs of Boulder, Montana.

It has been shown by Warnsdorf that the springs of Marienbad ascend through quartz veins, which strike in a northwesterly direction, and a similar condition is found, according to Muller, in the alkaline springs of Giesshubel. This explains why Hochstetter and Rosiwal sought for the continuation of the Carlsbad quartz veins in the north.

The relations of thermal springs to mineral veins also give us criteria for determining the chemical composition. Attempts have been made recently by geologists to explain the filling of veins by leaching of the neighboring rocks, but careful tests—I call attention especially to those by Stelzner—have shown that this process alone does not suffice to explain the phenomena. The springs of Carlsbad are an illustration. There might be some reason for believing that the sodium chloride given off by Vesuvius came from infiltration of sea water, but the thermal springs of the Erzgebirge, in the interior of the continent, also carry salt. The fact is, that the easily soluble substances of the earth's interior are carried to the surface, while the less soluble compounds, such as those of the metals, are precipitated at considerable depths. This is the correct explanation of the sodium salts found in our medicinal springs.

The great quantity of combined and free carbon dioxide is of juvenile origin, and belongs to a late phase of volcanic emanations. If we consider the various elements present in the Carlsbad waters we will find, however, indications of other phases, for the hottest phase is represented by chlorine, fluorine, boron and phosphorus, although the usually associated metals—tin, bismuth, molybdenum, etc.—are absent. Sulphur is present together with selenium, thallium, rubidium and cesium, which are characteristic of the sluphide phase of some volcanoes; and the same is true of arsenic and antimony, which accompany sulphide ores; and of zinc, the single representative of the metallic ores. Among the other elements present are sodium, potassium, lithium, calcium, magnesium, strontium (barium in the chert), iron, manganese, aluminum and silicon, of which there is none that does not occur in ore deposits and scarcely any that are not found in the ejecta of volcanoes. Of course, there may be a variance of opinion as to whether the granite has not furnished some of the last-named elements since they all are found in this rock, but considering the important contributions from the earth's interior, this matter seems of minor importance.

To summarize: The temperature of gases given off by volcanoes approaches or exceeds the melting point of rocks; the gases do not, therefore, come from vadose infiltrations. The hottest fumaroles are dry, while steam and thermal solutions belong to later stages of eruption. The "tin hat" overlying the sulphides of the Erzgebirge is indicative of the hottest, subliming phase of activity; the other vein materials, including the sulphides, belong to subsequent phases of which hot springs are only a reflex. There are vadose and juvenile springs. Vadose springs are fed by infiltration of meteoric water; juvenile springs are brought into existence by volcanic activity, and their waters are original contributions to the world's store. The Carlsbad springs belong to the second class, hence there is nothing upon which to base an investigation as to their zone of infiltration, their depth, or the relation of their solid constituents to the granite. Whether the waters are still engaged in the deposition of ores, and thus reach the surface in an impoverished condition, can hardly be determined, although the presence of zinc, antimony and arsenic may be considered as affirmative evidence.

Of vadose springs we have a good example in Pfafers-Ragaz, which is in a region of Tertiary sediments. The temperature of the water is 38.7°, and the dissolved solids amount to only 0.299 gram. The outflow is about 800 m. above the sea, while the catchment basin lies between 2,396 and 2,032 meters. The volume of discharge increases each year after the melting of the snow. As it has been shown by tunnel observations that the isogeotherms in mountainous regions conform more or less closely to the surface contours, the difference in altitude of the points of infiltration and outflow suffices by an increase of 1° in 30 or 31 m. to raise the temperature of the water from 0° to 37.8°. But the conditions are not so simple, for it may be questioned whether the waters pursuing such a direct course would be sufficiently warmed. It is to be assumed rather that there is a uniform water-level maintained by seepage through a communicating system of fissures or joints, and that the temperature of this ground-water corresponds to the earth temperature at that depth. The springs have their source at the deepest point of the ground-water level. Under these conditions the increase of hydrostatic pressure due to the melting of the snow would add to the discharge without lowering the temperature. The springs of Fischau, near West Neustadt, on the other hand, show seasonal variations in both discharge and temperature. The waters here are a mixture of a variable quantity of cold vadose water and of a constant quantity of warm water, which is probably of juvenile character.

It is possible to recognize five classes of springs. The first class includes the ordinary potable waters, which may have a shallow or deep origin, and show the mean earth temperature. The waters contain more or less carbonates in solution, and are of vadose character. The second class comprises also vadose waters, but they are characterized by more than ordinary mineralization. The iodine waters of Hall and Darkau, and the magnesia waters of Saidschutz and Pullna belong here. The third group comprises the thermal, vadose springs of mountainous regions. The high temperature of these waters arises from an upward trend of the isogeotherms and the difference in elevation between the points of supply and outflow. The quantity of dissolved

* "Ueber-Heisse Quellen," von Edouard Suess; Gesellschaft Deutscher Naturforscher und Arzte, Verhandlungen, 1902. Leipzig. Translated by D. H. Newland.

[5] Elie de Beaumont, "Note sur les emanations volcaniques et metalliferes," *Bulletin* Societe geologique, vol. iv, 1847, page 1273.

[6] Daubree, "Geologie Experimentale," page 120.

[7] See De Launay, "Annales des Mines," August, 1897, page 47.

[8] Annual Report of the United States Geological Survey, xxi, 1900, part ii, page 240.

solids is usually small. The springs of Bormio and Pfaffers are of this class. It is to be noted that vadose artesian springs are not of such widespread occurrence as has been supposed. The fourth group includes juvenile springs which show no seasonal variation, but still have a wide range in temperature in different localities, the minimum being the mean earth temperature and the maximum 70° or more. Some of these springs are neutral, like Teplitz (47.4°) in porphyry, or Plombieres (71°) in granite; others contain small quantities of minerals, such as Bourbon l'Archembault (53°) in gneiss, Evaux (50.7°) in gneiss, and Neris (52.8°) in granite; while still others are highly mineralized like Marienbad (11.2°) in granite, and Carlsbad (73.8°) in granite. All the examples cited are closely associated with quartz veins, or have deposited chert in their vicinity. In many instances veins of fluorspar occur, and deposits of barytes and pyrite are common; zeolites are found at Plombieres and galena at Bourbon l'Archembault. This group includes the hottest thermal springs of Europe. The fifth class comprises the eruptive springs, which are allied to the Stromboli phase of volcanoes.

The five groups here given do not include all springs, nor are they of equal importance. Groups 1, 2, 3 are vadose, 4 and 5 are juvenile. It is recognized that the division between vadose and juvenile springs cannot be closely drawn, as the two kinds of water are not uncommonly found in the same spring. Accurate observations as to variation in temperature and discharge have not been made in many cases, and too much dependence must not be placed upon chemical composition and geological structure. That the discharge of juvenile springs may be increased at periodical intervals by pressure from a layer of vadose ground-water seems possible, and this condition prevails probably at Teplitz.[9] Here is a broad field for investigation.

When juvenile thermal springs reach the surface, a portion of the dissolved mineral constituents is deposited by the cooling of the water which then mingles with the vadose ground-water. The Carlsbad springs carry annually more than 1,000,000 kg. of juvenile sodium chloride. Thus the sea is not a contributor to this activity, but rather profits by it. The remarkable agreement between the dissolved substances in ocean waters and juvenile thermal springs is not surprising when we recall that the ocean has derived its mineral content from juvenile sources. The atmosphere receives also such contributions. The great quantities of carbon dioxide which escape from the earth at hundreds of places along the southern border of the Erzgebirge are of juvenile origin, and are a direct addition to the carbon dioxide of the air. The question has been raised recently by Gautier whether the possible excess of carbon dioxide in the earth's atmosphere does not escape into stellar space.[10]

Thus we find that the hot fumaroles, the deposits of tin, the hydrochloric acid ejected by Vesuvius, the sodium chloride of Altensalza, the hot vapors which recently destroyed so many thousands of lives in Martinique, and the beneficial medicinal waters of Carlsbad are inseparable incidents in a single series of phenomena brought about by the degasification of the earth—a process like unto the cooling of a great mass of steel or to that going on in the orb of the sun.

COAL IN BRAZIL.—Experiments have recently been made by the Dona Thereza Christina Railway, in the State of Santa Catharina, Brazil, with coal from the Tubara Mine in the same State, which are stated to have proved the excellent character of the fuel. The discovery of coal is also reported at Santo Antonio de Imbetuva, in the Pontao Grossa District.

[9] Franz E. Suess, "Studien uber unterirdische Wasserbewegung," *Jahrbuch* der geologischen Reichsanstalt, vol. xlviii, 1898, page 481.

[10] *Comptes rendus*, vol. cxxxi, 1900, pages 647-652, and vol. cxxxii, 1901, pages 189-194. The investigations by Gautier indicate that certain gases, including hydrogen and carbon dioxide, are set free by the action of hot waters upon the ores contained in granite. Whatever importance may be attached to these results, it is to be noted that a great number of ore deposits shows no traces of such decomposition by hot waters.

CYANIDING SULPHO-TELLURIDE ORES.*

By PHILIP ARGALL.

The successful use of bromo-cyanide in the treatment of the unroasted sulpho-telluride ores of West Australia has attracted quite a little attention in the United States, more particularly, perhaps, from those having mining interests in Cripple Creek, Colo. The very fact that sulpho-telluride ores can be treated without roasting, appeals at once to the small producer, who immediately sees a method for reducing his ore to bullion without the use of the usual cumbersome, and often expensive, roasting plant.

The method of working the West Australian ores in the raw state, by means of fine grinding and subsequent treatment with bromo-cyanide, is known as the Diehl process, apparently now established as an economic and commercial success in the treatment of Kalgoorlie ores. I herewith propose to compare this process of cyaniding with the roasting method as heretofore practiced on the ores of Cripple Creek.

The Kalgoorlie ores contain a large quantity of calcium and iron carbonates, together with a small quantity of magnesia. Estimating the latter component at $CaCO_3$, Mr. H. Knutsen gives the following approximate analysis of three samples: Insoluble, 57.98, 59.61 and 76.91 per cent; $FeCO_3$, 19.29, 13.94 and 12.11 per cent, and $CaCO_3$, 22.55, 26.73 and 9.18 per cent.

The sulphur appears to have been neglected in the analysis. Mr. Alfred James, however, gives as a typical analysis of these ores: SiO_2 about 50 per cent; CaO, 10; Al_2O_3, 5 to 20 or more; MgO, 1 to 5; S, 3 to 7; Cu, 0.1 to 0.3; Pb, trace; Zn, 0.02; As, trace; Sb, 0.02; Te, 0.03 to 0.1; and $CaCO_3$, 6 to 17 per cent. Ores of this character after roasting when the solutions reach them, form a lime-iron cement which sets hard in the tanks and greatly interferes with, and often prevents, the percolation of the solutions through the charges. For this reason early attempts at leaching the roasted ores at Kalgoorlie were far from successful; furthermore, these Australian ores, while containing an appreciable quantity of free gold in a comparatively granular condition, still require to be ground very fine in order to obtain a high rate of extraction; the fine grinding produced troubles in the subsequent handling of the slime, and led to the early introduction of filter presses, which soon became standard in the cyanide practice of West Australia.

One of the most successful combination processes for reducing the sulpho-telluride ores at Kalgoorlie is briefly outlined as follows: Crushing dry to about 30-mesh size, roasting in mechanical furnaces, fine grinding and pan amalgamation in dilute cyanide solutions, separating the sands from the slimes, treating the latter in the filter presses and the former in tanks, or, as an alternative, reducing the ore under treatment to such a fine state of division in the grinding pans that it is all successfully treated in the filter presses, thereby abolishing the leaching in the tanks. According to Mr. Alfred James the Kalgoorlie sulphide ores yield, without roasting, from 50 to 70 per cent extraction when treated by agitation with ordinary cyanide solutions. My experiments on Cripple Creek telluride ore gave almost identical results; in fact, the lowest extraction on 30-mesh size raw ore that I have observed is 54 per cent. It is perhaps permissible to state that fuel is quite expensive in Kalgoorlie, and water may be said to command famine prices, from which it is evident that roasting is at a disadvantage, costing, it is said, on those low tenor sulphide ores, from $1 to $3 per ton, while power costs from 70 to 90c. per horse-power per day. Under these conditions a wet process for working the ore in the raw state has at least a fair show.

The use of the halogen cyanides as accelerators in the cyanide process was discovered and patented by Dr. Gaze in 1892, and in February, 1893, a cyanide mill near Reefton, N. Z., used chloro-cyanide in the solutions; but owing to difficulties in precipitation, the process was soon abandoned. In 1894 Messrs. Sulman & Teed, of London, patented a bromo-cyanide process, and to these gentlemen is due the credit of applying bromo-cyanide to the direct treatment of telluride ore. It is well known that cyanogen in the semi-molecular or nascent state has a powerful action on gold, that bromo-cyanide itself has but little if any solvent power on gold, but when added to a cyanide solution, it not only liberates a molecule of cyanogen from the latter, but also contributes its own cyanogen, thus: $KCN + BrCN = KBr + 2CN$.

Bromo-cyanide must be considered as a cyanogen liberator, and it is no doubt through the intense chemical activity of the nascent cyanogen thus liberated that the tellurides are attacked, at least to the extent of setting free part of their contained gold. Briefly, the combination bromo-cyanide process evolved by Dr. Diehl is as follows:

(1) Stamping the raw ore with or without amalgamation, as may be found expedient.

(2) Separating the heavy minerals from the gangue by concentration.

(3) Roasting the concentrates and returning the roasted tellurides to the batteries for amalgamation, or selling the concentrates to the smelters.

(4) Sliming all the tailings from the concentrators so the material will pass a 200-mesh screen.

(5) Agitating this fine pulp for at least 24 hours in cyanide solutions, to which a solution of bromo-cyanogen is added from time to time.

(6) Filter pressing the agitated slimes.

The Diehl process is fully described by Mr. H. Knutsen[1] in a very able and interesting paper, from which the following comparative data of costs are taken. The process is in use at one property alongside a roasting plant, both treating the same class of ores; in the roasting plant two-thirds of the ore is treated in filter presses and one-third in leaching tanks, while in the Diehl all the ore must be filter pressed.

In the roasting process, 3,411 tons were treated, which yielded 5,287 oz. of bullion and no concentrates, while with the Diehl process 5,888 tons were treated, yielding 5,201 oz. of bullion and leaving 3,819.47 oz. in the concentrates. If the concentrates represent but 0.5 per cent of the ore, as reported, then practically 42 per cent of the value of the crude ore is locked up in about 30 tons of concentrates. These latter are treated at the smelting works, with the following results in expenditures per ton treated, August, 1901:

	Roasting process.	Diehl process.
Superintendence	$0.34102	$0.24026
General stores and charges	0.32612	0.38932
Electric light	0.33122	0.29028
Assaying, retorting and smelting	0.42072	0.36150
Fuel	2.21096	0.83492
Water	0.82092	0.76694
Compressed air	0.32508	0.48418
Filling and emptying vats	0.29128	.....
Labor, general	0.27956	0.45236
Engine-driving and firing	0.22958	0.15324
General repairs	0.78116	0.54448
Screens, shoes and dies	.....	0.00680
Elevating	.....	0.06962
Cyanogen bromide	.....	0.96092
Potassium cyanide	0.72554	0.67192
Zinc	0.76836	0.52454
Filling and emptying presses	0.40506	0.60342
Filter-cloth	0.09472	0.06196
Chemicals	0.02098	0.02002
Firing roaster	0.29916	.....
Agitation	0.29446	.....
Royalty	.....	0.42392
Totals	$8.96590	$7.86060

Taking the difference in fuel cost between the two processes, and adding the expense of firing the roaster, we find the approximate cost of roasting as $1.6752. The cost of bromo-cyanide is $0.96 per ton of ore treated; to this, the royalty for the use of the process should be added, and a total of $1.3848 is obtained as an offset to the roasting, which show $0.29 in favor of the Diehl process. It was claimed that the same quality of ore went to both plants, but the Diehl gave a return amounting to $0.88 per ton more than that from the roasting process. This comparison appears to me to be somewhat favorable to the Diehl process, if, indeed, a strict comparison of the

* From advance sheets of "The Mineral Industry," vol. xi, now in press.

[1] *Proceedings* of the Institution of Mining and Metallurgy, 1902, London; see also "The Mineral Industry," Vols. ix and x.

costs of the rival processes was intended; for example, the capacity of the roasting plant appears to be about 60 per cent of that of the Diehl, yet the cost of supervision, engine driving, etc., is about 50 per cent greater for the smaller plant. It is in the final products of the plants, however, that the most unfair comparison creeps in; the roasting process produces all its yield in bullion, while the Diehl leaves about 42 per cent of the bullion content of the ore in the form of high-grade concentrates, which can neither be handled nor roasted without loss of metal. There is also an additional smelting charge for extracting the values from the concentrate that is apparently not included in the forgoing expense table. Furthermore, the roasting plant is not credited with flue dust or sweeps, and one cannot believe that the roasting of ores of this character would be attempted without the usual equipment of dust flues and settling chambers.

In a newer Diehl plant the concentrates, amounting to about 5 per cent of the ore treated, are roasted and returned to the batteries for amalgamation, the pulp from the raw as well as from the roasted ores, mingling together, are treated in agitators for 24 hours with cyanide and bromo-cyanogen solutions. The final tailings are said to "average from 1 to 2 dwt. gold per ton, no matter whether the original ore contained 1 oz. or 4 oz. gold per ton." The consumption of chemicals is given at about 3 lb. KCN and 1.25 lb. BrCN per ton of ore. The working cost is summarized as follows: Milling, 97.18c.; concentration, 38.38c.; treatment, concentrates, 32.16c.; extraction, $4.1004; total, $5.7776.

The bromo salts alone amount to $1.20 per ton of ore treated. It will be noticed that bromo-cyanide is not depended on to break up the gold tellurides completely, hence these minerals are first concentrated out so far as is possible, and afterward roasted to set the gold free for amalgamation. In the next place, a tailing approaching $2 in value can scarcely be considered a satisfactory termination of such an elaboration of processes. Yet it is extremely interesting to know that such good work can be accomplished by a wet process, or at least one that eliminates from 80 to 95 per cent of the roasting usually found necessary in treating sulpho-telluride ores. Such a process will have a great future in places where roasting is expensive, either through lack of fuel, or the high sulphur content of the ore; provided that in either case, the bromo-cyanide will extract the values.

The sulpho-telluride ores of Cripple Creek are virtually altered granites, phonolites and andesites, containing slightly more silica and considerably more iron and sulphur than the original rocks, but, on the whole, practically of the same chemical composition. Tellurium and fluorite are present in little more than traces. The ores received at a custom works contain but little carbonate, and when roasted, exhibit no tendency to harden or set in the tanks unless an excess of lime has been added. Ordinarily a good extraction can be obtained on roasted ores crushed no finer than 30-mesh size (0.017 in. opening). The sulphur content of the ores varies from 1 to 7 per cent, and may be said to average approximately 3 per cent. These ores are quite easily roasted, and the entire process of roasting and cooling would vary in cost from 30c. to 50c. per ton, depending on the sulphur content and on the arrangement of the roasting plant. About four years ago I made a complete estimate of the cost of cyaniding Cripple Creek ores at a proposed new works to be erected at Canon City. The works were designed to treat 500 tons of ore per day, to be later enlarged to 750, or even 1,000 tons, provided the ore market justified the increase. I had intended to use the roasting process with some important modifications and improvements which were developed during my experience at the works of the Metallic Extraction Company, and tested to finality on a working scale at that plant. The estimate of the actual cost of milling the ore, extracting the values, and marketing the bullion on a basis of treating 500 tons per day, worked out to $1.75 per ton of ore. The proposed new method of treatment not only substantially reduced the working cost, but gave also an increased extraction over that attained at the old plant.

On the strength of this discovery and on the improvements that could be made in a new plant, a site for the proposed works was selected near Canon City, and the Florence & Cripple Creek Railroad extended a branch into that city to accommodate the plant; however, before the new road was completed both the Metallic Extraction Company's works and the railroads were under option for sale, and were subsequently sold, which caused the scheme for the cheap milling of Cripple Creek ores to fall through and with it, for a time at least, the prospect of treating $5 ores at a profit to the miner.

It is true that those results have not been attained in practical working on a commercial scale, but, nevertheless, there is no question as to their accuracy or of the fact that Cripple Creek ores can be roasted and cyanided in a modern up-to-date plant of 500 tons daily capacity at a cost of $1.75 per ton. But one need not enter into the question of the total cost of cyaniding Cripple Creek ores in order to compare the Diehl with the roasting process now in use. I believe the following will suffice:

Diehl process:	
Bromo-cyanogen and royalty	$1.00
Fine grinding	0.50
Filter-press work and agitation	1.25
Total cost	$2.75
Roasting process:	
Roasting	$0.50
Tank-work	0.25
Total cost	$0.75
Difference in favor of roasting process	$2.00

Assuming the cyanide consumption to be the same in each case, it is evident that the cost of bromo-cyanide, plus grinding from 30-mesh size to 200-mesh size, plus filter press work, plus concentration, would have to aggregate less than $1 per ton before the Diehl process could compete successfully with the roasting process in the treatment of Cripple Creek sulpho-telluride ores. Therefore, the latter process must prevail at Cripple Creek, as, in my opinion, it will ultimately prevail at Kalgoorlie.

RELATION OF ROCK SEGREGATION TO ORE DEPOSITION.*

By J. E. Spurr.

Introductory.—Two important points regarding ore deposits have come to be agreed upon: (1) That ores in general were originally derived from igneous rocks, and (2) that present ore deposits are usually closely associated with actually exposed eruptives. The interdependence of eruptive rocks, hot springs, and many ore-deposits has at last attained the dignity of a general law. The broad explanation of this association is plainly contained in the proof which we now possess, that the eruptive rocks contain in varying amounts the rarer elements in addition to the common ones, while in the stratified rocks metals, though present, seem to be in general less abundant.

Segregation or Differentiation of Igneous Rocks.—While it is known that igneous rocks may be occasionally formed directly from the fusion of sediments (in which case their composition is determined by the selective action of surface agencies), yet it is now widely accepted that many, possibly most of them, owe their peculiarities of composition to a process of segregation which goes on within the molten masses of the earth's interior. The line of argument is best seen if we proceed from examples on a small scale to successively larger ones. Thus, in a laboratory, materials intimately mingled in solution may separate into distinct crystals or into segregated bunches of like crystals. Nearly every igneous rock shows irregularities due to a similar clustering together of like minerals. These aggregations increase from microscopic size to the size of a man's head, and from these patches there is a gradation to larger rock masses. In still larger igneous masses, it is found that various portions have slightly different characters, while they all grade into one another. Again, in a given district different igneous rocks, erupted at separate periods, are often closely related and pass into one another. Finally, the rocks of a large region taken collectively, often present constant differences from those of neighboring regions. All these phenomena may be explained by the observed fact that in the molten mass, as well as in ordinary solutions, there is a force inducing like elements to group themselves together.

Study of this rock segregation or differentiation shows that a molten rock mass under favorable conditions tends to separate into a more acid (siliceous) and a more basic portion, and that the change is effected at each stage by the separation and crystallization of the more basic constituents, leaving the more siliceous residue unconsolidated. Contemporaneous with the increase of silica in the process of segregation there is also an increase in the amount of water. All rocks contain water, but the molten material contains more than the resulting rock. Most of this water is expelled at the moment of solidification, together with certain gases and a great variety of other materials held in solution. When rocks cool at the surface, the escaping water forms the clouds of steam, highly charged with gases and minerals, which issue from fissures, and when they solidify below the surface the waters and gases may be forced into the enclosing rock, producing that recrystallization and rearrangement of its constituents which is called contact metamorphism.

Most of the materials segregated in the molten mass are not commercially valuable. Thus the frequent formation of masses of nearly pure hornblende, pyroxene, or quartz has no lively interest for the miner, but when such segregations are of feldspar or mica they may acquire economic importance; and segregations of metallic minerals are of still greater interest.

The Formation of Mineral Segregations in Molten Masses.—The basic minerals of the molten mass may be so concentrated as to be almost the exclusive constituents of some of the resulting rocks. Thus there are rocks made up essentially of the dark, heavy, ferro-magnesian minerals, such as biotite, olivine, pyroxene, and amphibole, together with metallic minerals such as magnetite and ilmenite. The siliceous materials likewise may form rocks without important admixture of the basic ones, such as quartz-alkali-feldspar rocks (alaskite). Further, the crystals of a single mineral may group themselves together to form entire rocks. Thus there are rocks consisting almost entirely of olivine alone (dunite), of hornblende alone (hornblendite), of pyroxene alone (pyroxenite), of orthoclase feldspar (sanidinite), of soda feldspar (anorthosite), and of lime feldspar (anorthite rock). This completes the list of the commonest rock constituents, save mica and quartz. Mica is not known to occur as the only essential mineral in any considerable mass of igneous rock. Quartz also appears at first sight to be an exception, but the writer will try to show that this is not the case, and that many considerable masses and veins of quartz are the result of segregation from the same molten material that produces other igneous rocks.

This being the case, it is natural that the rarer elements should also segregate and should be found in certain rocks in far larger quantity than in others, and, indeed, this is known to be the fact.

Concentration of Commercially Valuable Minerals by Segregation Within Molten Masses Previous to Their Consolidation.—Iron is unequally distributed in igneous rocks. Many highly siliceous rocks, such as granites and alaskites, have only a trifling quantity (1 per cent or less), while the basic rocks may contain 10, 15 or even 20 per cent of iron oxide. Of this iron, a part is generally in the form of magnetite. From the highly magnetiferous phases of ordinary basic rocks to a phase where the mag-

* Abstract (by the author) of a Paper read before the American Institute of Mining Engineers.

netite becomes the principal constituent is an easy step. The iron mineral may even increase so as to almost or quite exclude the other constituents, forming masses of iron ore.

Chromium is also very unevenly distributed in igneous rocks, being rare in the siliceous ones, while in the very basic rocks containing olivine it is sometimes abundant. In these rocks its relations are such as to show that it is one of the earliest minerals to crystallize. In these rocks the chromite may locally become so important as to form the chief constituent.

Nickel occurs as an original constituent of some olivines in basic igneous rocks. It is also found in more considerable amount in pyrrhotite, a sulphide of iron which is frequently a primary material in igneous rocks and one of the first to crystallize. Nickel also occurs as an alloy with native iron in meteorites and in basalt. In certain igneous rocks nickel is much more abundant than in others of the same petrographic character. Cases where nickeliferous pyrrhotite in basic igneous rocks, evidently a primary constituent, gradually increases so as to form compact masses and to become a valuable ore, have been described on the best authority.

Platinum is closely associated with chromite and nickel, and like these is almost invariably genetically connected with basic olivine rocks, or with the serpentine rocks arising from the alteration of these.

Copper, as an original constituent, is known to enter into the composition of the dark ferro-magnesian silicates of the igneous rocks. It occurs also in meteorites and alloyed with native iron in the Greenland basalt. The segregations of pyrrhotite already noted in connection with nickel, are frequently cupriferous, and even contain copper pyrite. The magmatic segregation of the pyrrhotite being granted, we must conclude that the copper has been concentrated chiefly in the same way.

The Origin of Certain Gold-quartz Veins.—Native gold has been found in both basic and acid rocks. Commercially valuable concentrations of gold are connected with a great variety of igneous rocks and occur in many different forms. Most of the known processes by which ore-deposits are formed have probably been active in producing the gold ores, nevertheless the writer believes that the metal is concentrated by preference in siliceous magmas.

After studying the Yukon gold-quartz veins in 1896-'97, the writer announced the theory of their formation as the end product of rock segregation in the region where they occurred. The following is a brief outline of that theory:

In considering the segregation of igneous rocks, the conclusion has been reached that many magmas segregate by consolidation of the basic portions, leaving a more siliceous residue. Just as this process may result in rocks of extreme basicity, and even in segregated masses of the metallic minerals which are ordinarily accessory constituents, so at the other end of the series very siliceous rocks arise. From the siliceous granites the transition is gradual to rocks consisting almost entirely of quartz and alkali feldspar. To rocks of this latter group the writer has applied the general term of *alaskite.* These alaskites may pass gradually into quartz veins.

On Forty-mile Creek, Alaska, are great quantities of dike rocks. The rocks which occur in greatest bulk are hornblende granites and hornblende diorites. From these rocks the change is very gradual to extremely basic rocks on the one hand, and to siliceous rocks on the other. The basic hornblende granite changes into biotite granite. The diminution of the amount of biotite gives rise to extremely siliceous granite, and this passes into alaskite. In the alaskite series the change is continued by a relative increase in the amount of quartz and decrease of feldspar. One phase of dike rock shows a groundmass consisting almost entirely of quartz in small interlocking grains. In this groundmass are scattered porphyritic crystals of feldspar. The superabundance of quartz in these very siliceous dikes tends to segregate into bunches which may become large, and which have all the characteristics of ordinary vein quartz. With the increase in silicification the quartz begins to occupy an important portion, and finally the larger portion of the dike. The feldspar becomes restricted to certain places, sometimes occurring irregularly, sometimes collected near the walls where the quartz lies in the center. Finally, with the disappearance of the feldspar, the dike becomes an ordinary quartz vein. These veins contain pyrite, argentiferous galena and free gold. From them a portion of the Yukon placer gold has been derived.

Therefore, it has been concluded that certain quartz veins in the Yukon District, part of which at least are auriferous, have originated by a process of magmatic segregation which has separated them from other materials while in the state of aqueo-igneous fusion (the condition of molten rock in general), and that they represent a siliceous extreme of that process. From this standpoint they are a variety of igneous rocks. But it has been shown that as magmas become more siliceous they also contain more water, so when the stage of quartz veins is reached the magma is believed to be so attenuated that it may best be described as water highly heated, heavily charged with mineral matter in solution.

From a review of the literature of gold-quartz veins, it is found that they are intimately associated in general with siliceous intrusive rocks. Evidence of this is found in descriptions of quartz veins in British Columbia, Alaska, Nova Scotia, various parts of the United States, British Guiana, Scotland, Norway, the Urals, India, China, Siberia, Australia and South Africa. Gold-quartz veins may indeed occur in or near basic intrusions, and may even be genetically dependent upon them, but certainly an overwhelming majority of gold-quartz veins occur in connection with rocks of the dioritic and granitic families, that is to say, with the two more siliceous families of the three which make up most igneous rocks. And of these granite-diorite rocks, the veins show a decided preference for the more siliceous groups, such as quartz-diorite (tonalite), granite and alaskite. Therefore, the statement may be formulated that *although gold is present in all igneous rocks, and may be unequally distributed in any of them, the conditions for concentration by magmatic segregation become more favorable in proportion as the rock becomes more siliceous, and becomes most favorable in what has been shown to be the extreme siliceous product of rock differentiation in quartz veins or dikes.*

MAGNESITE—ITS USES AND VALUE..

By CHARLES C. SCHNATTERBECK.

It is not many years since the consumption of magnesite in this country was infinitesimal, being limited to the preparation of artificial mineral waters and medicinal salts. Now it is universally recognized as a superior refractory material for lining basic open-hearth furnaces and cement kilns; in fact, it may be employed to advantage wherever high temperatures and chemical reactions are usually detrimental to dolomite, chromite, Dinas and silica brick. The distinctive characteristics of a magnesite lining are durability, freedom from moisture and silicic acid, and resistance to corrosion when exposed to the action of basic slags and metallic oxides. These qualities make the lining cheaper than most others in the long run. Lately, inventors have turned their attention to magnesite, and have patented artificial lumber, fireproof cement, covering for pipes and boiler tubes, composite stone for lithographing, etc. Invariably, calcined magnesite or magnesium chloride is the principal ingredient; sometimes both. Patents issued to Valentine Conte, George de Geoffroy and George C. Gall du Terte, of Paris, by the United States Patent Office for an artificial stone, cement or similar product, shows the composition to be: Aluminum sulphate, 15 parts; pulverized kieselguhr, 15 parts; calcined magnesite, 50 parts; magnesium chloride, 25 parts; magnesium sulphate, 75 parts, and inert matter to give the required density and specific gravity.

To show the growing importance of magnesite it may be said that in the past five years the consumption in the United States has increased fully 135 per cent, and is now at the rate of 40,000 long tons anually. Most of this is imported, free of duty, from the island of Euboea, in Greece, and from Austria-Hungary, while smaller quantities are obtained from Silesia, Germany, and Napa County, California. Other deposits exist in Minsau, Hungary, in Swedish Lapland, the Ural Mountains in Russia, in Quebec, Canada, and in India, but most of these are too far from facilities for economical transport to permit of their development.

The better quality of magnesite marketed in this country comes from Greece. In the crude state it analyzes as high as 98 per cent magnesium carbonate, but more often averages between 94 and 96 per cent, and in addition contains approximately 4.40 per cent calcium carbonate; 0.08 per cent ferric oxide; 0.52 per cent silica, and 0.54 per cent water. Crude magnesite sells, f.o.b. New York, at $5.50 to $6 per long ton. Calcined at dead heat for refractory purposes, the mineral analyzes from 82.46 to 96.25 per cent magnesia; 0.85 to 10.92 per cent lime; 0.56 to 3.54 per cent ferric oxide and alumina, and 0.73 to 7.98 per cent silica. Variations are due to the quality of crude product sintered. The calcined article brings $15.50 to $16. per short ton, f.o.b. New York. Bricks made from calcined magnesite contain approximately 93.876 per cent magnesia; 3.2 per cent silica; 0.3 per cent ferric oxide, and a small amount of carbonic acid, alumina and calcium oxide. The imported bricks are now offered at $155 per 1,000, f.o.b. New York, and are shipped in iron strapped crates of 30 bricks each. The domestic quoted at $200, f.o.b. Pittsburg, while those made bricks, containing Grecian magnesite only, are of other magnesite sell at $160. Occasionally American brickmakers will employ magnesite and chrome ore, mixed together, and it is understood such a product has given satisfaction. Chrome ore, however, is too expensive and difficult to get in quantity or quality desired, to permit of its extensive use in brick making.

CHROMIUM AND CHROME ORE IN 1902.*

By JOSEPH STRUTHERS AND HENRY FISHER.

The output of domestic chrome ore in the United States is but a small fraction of the total consumption, the great bulk of which is supplied from Turkey. While chromite occurs in California and North Carolina, the combined cost of mining, treatment and transportation to Eastern chemical works is greater than the cost of the ore abroad plus the ocean freight to the seaboard works, and as there is no duty on the ore, the development of the mines in the United States is necessarily hindered. During 1902 the chrome ore mines in California contributed the entire domestic output of 315 long tons, valued at $4,725, as compared with 498 long tons, valued at $7,740 in 1901. The value of chrome ore varies with the content of Cr_2O_3 and silica. The standard ore is 50 per cent Cr_2O_3, and the price is increased from 75c. to $1 per long ton for every unit of Cr_2O_3 above 50. While no fixed premium or penalty is given for the silica content, ores containing small quantities of this component command higher prices. The average price of the domestic chrome ore sold during 1902 averaged $15 per long ton. The average value of the chrome ore imported during 1902 was $14.73 per ton.

Despite the increased use of ferrotitanium and ferrotungsten for purposes previously filled by ferrochromium, the production of the last-named alloy showed no decrease during 1902 as compared with 1901, the Willson Aluminum Company, with mills at Kanawha Falls, W. Va., and Holcombs Rock, Va., reporting an output of 1,200 long tons of ferro-

* From advance sheets of "The Mineral Industry," vol. xi; now in preparation.

chromium for each year. There has been no radical change in the technology of chrome ore and chromium compounds during the past year (details of which are given in the "Mineral Industry," Vols. IX and X), although the use of chrome-steel rails is noteworthy. The Pennsylvania Railroad is experimenting with chrome-steel rails at a portion of the road subjected to the extreme service of heavy trains and sharp curves. The alloy used in the manufacture of the rails consists of Cr, 50 per cent, and Ti, 7 per cent, and the percentage of chromium in the finished rail is said to be within the limits of 0.75 per cent and 1 per cent. The plant of the Baltimore Chrome Works has been sold for $1,000,000 to the Kalion Chemical Company, of Philadelphia. This company supplies the greater part of the potassium chromate and bichromate salts used in tanning and dyeing in the United States, its output being manufactured from ore imported from Turkey.

The production, imports and approximate consumption of chrome ore in the United States is shown in the following table, in long tons:

	1901.	1902.	Changes.
Production	498	315	D. 183
Imports	20,112	39,570	I. 19,458
Consumption	20,610	39,885	I. 19,275

The California production of ore is sold crude. The entire output during 1902 was derived from the Shotgun Creek Mine at Sims, Shasta County. Other chrome ore mines are: Evans & Dougherty, Dunsmuir, Siskiyou County; Black Diamond, Glenn County; San Luis Chrome Concentrating Works, San Luis Obispo County; Tehama Consolidated Chrome Company, Tehama County; Mendenhall, Alameda County; and the San Francisco & San Joaquin Coal Company. The Shotgun Creek is favorably located adjacent to the railroad; the other mines were inoperative during 1902 as the additional cost of haulage to the railroads did not admit of profitable working.

Some notes on the production in foreign countries are given below:

Canada.—The production of chrome ore during 1902—reported as exports during that year—amounted to 816 metric tons, valued at $12,409, as compared with 1,159 metric tons, valued at $16,744 during 1901. The deposits of chrome ore in Coleraine, Province of Quebec, continue to furnish most of the product, one small mine being worked for crude ore, and another for supplying a concentrating mill. According to Mr. J. Obalski, 900 long tons of high-grade material, valued at $13,500, were shipped, of which 550 tons were in lumps and 350 tons in concentrated form. A reorganization of the two companies owning concentrating mills has taken place. The success of the Wilfley table has led to its adoption in preference to jigs. The usual jigging or other gravity method of separation has been combined with magnetic concentration which has resulted in raising the quantity of chromium oxide in the concentrates several per cent above the results obtained from either process alone, and as 50 per cent Cr_2O_3 is in most cases the critical commercial point, the extra expense of the combined method of treatment will doubtless be more than offset by the increased values obtained. There was no production of chrome ore in Newfoundland during 1901. A quantity of 83 tons of ferrochromium was shipped from Buckingham, where this product is manufactured.

Greece.—The production of chrome ore in Greece in 1902 amounted to 11,680 metric tons, valued at $140,160, as compared with 4,580 metric tons, valued at $47,770 in 1901. The chrome ore exported from the Magnesia district in 1902 amounted to 10,750 tons, valued at $40,310, as compared with 4,750 tons, valued at $16,310 in 1901.

New Caledonia.—The production of chrome ore in 1901 was 17,451 metric tons, valued at $189,200, as compared with 10,474 metric tons, valued at $126,000 in 1900. At Baie N'go, where the greater bulk of the New Caledonian chrome ore has been mined of late years, some of the mines have been closed on account of the poorness of the ore, and the production of the remaining mines has been considerably reduced. One or two mines have been opened recently at Nehoue in the Gomen District on the northwest coast, from which good results are expected. A combination of chrome interests among important chrome mine owners is projected, and should it take place an increased output of this ore may be expected in the near future. The mines in question are far in the interior, and the cost of transportation is large. Two French mining companies owning about 40,000 hectares (1 hectare equals 2.471 acres) have combined to form the Societe de Chrome, capitalized at 3,800,000 fr. The company is developing three mines, one in the South Bay, the second in Plum, and the third on Mt. Thiebaghi. The ores contain from 50 to 56 per cent Cr_2O_3. The deposit at Thiebaghi is leased to another company, which contracts to mine a minimum of 10,000 tons, and to pay a royalty of 15 fr. per ton. The mines on the South Bay are said to be especially rich. A railroad is projected to connect the South Bay with the best port of New Caledonia. A large quantity of ore has already been obtained from the Plum Mine, and when the necessary arrangements have been made it will undoubtedly continue to yield a large output. Unsorted chrome ore is worth from 45 to 50 fr. per ton at the mine, and from 54 to 56 fr. at the port of Noumea. A premium of 2.5 fr. per ton is allowed for each unit of Cr_2O_3 above 50 per cent.

New South Wales.—The exports of chrome ore from New South Wales during 1902 were valued at £1,740, a large decrease when compared with 2,483 long tons, valued at £7,774 in 1901; almost the entire output was mined at Gobarralong. At the chromite deposit at Bowling Alley Point in the Nundle division, the ore occurs in pockets in serpentine and is similar in characteristics to the Gundagai ore. A few tons, which were assayed at Sydney, were reported to contain 47 per cent Cr_2O_3. The great distance of the deposit from the railway rendered the profitable treatment of the ore very uncertain, although if a proper method of ore concentration were installed the deposit might be operated successfully.

New Zealand.—The exports of chrome ore produced by the mines near Croixelles Harbor, during 1900 amounted to 28 tons, valued at $550; there was no production in 1901.

Norway.—The most important deposits of chromium ore are at Roros, but during 1901 the mines suffered from a strike which lasted from March until the close of the year.

Turkey.—The exports of chrome ore from Turkey from March 14, 1901, to March 13, 1902 (Turkish year 1317), were 38,752 tons, as compared with 40,972 tons for the previous year. Of this total the European provinces Salonica, Kossovo and Monastir produced 11,650 tons, and the Asia Minor provinces Aidin, Konia, Adana, Angora, Brussa and Daghardi produced 27,102 tons. The principal ore deposits are near Salonica, Broussa and Macri. A rich deposit which has not been exploited exists at Denislie, the ore assaying 56 per cent Cr_2O_3. The Broussa mines have been developed recently, most of the output being shipped to the United States. The Daghardi Mine, which has a yearly output of from 12,000 to 15,000 tons of from 51 to 55 per cent chrome ore, exports about two-thirds of its output to the United Kingdom, the balance being divided about equally between America and Germany. The entire output of the Bozbelen Mine is exported to the United Kingdom. There are three chrome mines in the Province of Broussa, the Anteram, Cozlondja, and Miran, which together produce from 6,000 to 7,000 tons of ore annually. The concessions from these three mines, as well as the Cozbelen and Bozbelen mines, are held by the English firm of Paterson & Co., at Smyrna. The Bozbelen Mine exports about 1,500 tons of ore yearly. The Turkish Government taxes chrome ore 20 per cent and imposes a customs charge of 1 per cent. The total cost at the coast is $8.75 for Macri ore, and $11.74 for Broussa ore. For the past two years the Government has granted no new mining concessions, and permits the shipment of 2,000 tons of ore only from a new mine; when this quantity of ore has been mined a new permit to continue working must be obtained.

WELSH COAL ON THE TYNE.—The London *Colliery Guardian* says: "'To carry coals to Newcastle' has always been regarded as much a work of supererogation as painting the lily or gilding refined gold. Howbeit the steamer *Samus* recently cleared from Swansea with some 300 tons of Swansea Valley coal, shipped by Messrs. E. A. Cleeves & Co. to Gateshead-on-Tyne."

ABSTRACTS OF OFFICIAL REPORTS.

Ontario Silver Mining Company, Utah.

The report of this company for the year 1902 shows that 25,922 dry tons of ore were taken from the mine and worked in the mills. The receipts for ore sold were $338,863—$13.07 per ton; miscellaneous, $17,720; total, $356,583. Working expenses were $305,615, showing a profit of $50,968.

To this profit is to be added $1,538 miscellaneous receipts, and $402,828 brought forward from 1901, making a total of $455,334. Miscellaneous payments absorbed $7,691, and dividends $180,000; leaving a balance of $267,643.

The expenses for the year were as follows:

	Amount.	Per ton.
Mine account	$176,599.66	$6.81
Prospecting and sinking No. 3 shaft	76,558.90	2.95
Ontario mill and assay office	3,295.32	13
Tunnel No. 2	820.76	03
General expenses (less rents)	20,451.27	79
Ore expense	26,487.29	1.02
Concentrating expense	502.03	02
Ore sold from dump—Cost	900.00	04
Total expense	$305,615.23	$11.79

Superintendent C. L. Rood's report says: "In pursuance of the recommendation made in the last report, this shaft has been sunk to the 2,000-ft. level. Work was begun June 1, and is finished at this date. The formation was all limestone, which, upon exposure to air and water seepage, swelled badly, and caused a heavy strain upon the timbers. Between the 1,700-ft. and 2,000-ft. stations this strain had to be continuously relieved, and many of the timbers replaced. Owing to this fact and to the delays incident to pumping, progress was unexpectedly slow.

"Much prospecting was done above the 1,500-ft. level to clean up remnants of old stopes and to test fully small blocks of ground that were left standing between ore chutes worked out in previous years. This required 1,086 ft. of raises, cross-cuts, etc., besides considerable dead work in lateral drifts from old stopes. Similar development may well be continued in the future, whenever better returns can be obtained for our ores.

"The 1,600-ft. level east was run six years ago from the bottom of a winze, which is about 700 ft. north of shaft No. 2. During the past year this winze was thoroughly repaired and timbered, and some work done in the level in anticipation of the connection to be made from the east drift on the 1,700-ft. level. Considerable ore has been exposed by the previous work in this level, and there is reason to expect a continuation of the same for a distance of 190 ft., on the dip of the vein, to the 1,500-ft. level.

"The east drift of the 1,700-ft. level was further extended 190 ft., when it encountered a broken formation not favorable to ore and very expensive to keep open. It was accordingly stopped. There was also a cross-cut run to the north a distance of 94 ft. At a point 400 ft. east a raise was put up 150 ft., connecting with the 1,600-ft. level as mentioned above. This raise was continuously in ore, principally of a concentrating grade. On the track level of this east drift there are about 200 ft. of ground in which ore is exposed. While at intervals the vein is spotted, it shows large bodies of concentrating ore mixed with bunches of galena, assaying well in silver and lead.

From the foregoing it will be seen that we have a section of ground here 340 ft. on the dip to the 1,500-ft. level, which should produce a large tonnage.

"The west drift has been driven during the year 876 ft., with 156 ft. of cross-cuts. A raise was put up 188 ft., connecting with the 1,500-ft. level. The mineralization, day by day, in the face of this drift, has been stronger than was shown in driving the 1,500-ft. level. Subsequent development of the latter proved the exsitence of the best ore found since leaving the 1,100-ft. level. Whether a similar experience awaits us in this drift of the 1,700-ft. level remains to be demonstrated whenever detailed development can proceed economically through actual stoping. So far the ore has occurred in bunches, aggregating at least 400 ft. on the strike of the vein, in which the width of the ore ranged from 1 to 4 ft., the values varying from a concentrating to a fair shipping grade. No work has yet been done which shows a continuous ore-shoot to the 1,500-ft. level, therefore the tonnage in this section is uncertain. This drift is not yet far enough west to get under the body of ore on the 1,500-ft. level, about 1,850 ft. west of the shaft. From the raise just mentioned a drift has been started 90 ft. below the 1,500-ft. level, to be called the 1,600-ft. level west. This and other work will be pushed to assist in determining ore reserves and to open the ground for advantageous ore extraction.

"On the 2,000-ft. level a cross-cut will be run during 1903 to intersect the vein, and drifts driven east and west. All indications point to finding a good vein, well filled with ore, but carrying more lead and zinc in proportion to silver contents. Wherever ore occurs on the 1,700-ft. level it is as good in the bottom as elsewhere, and the ore channel throughout is strong and well defined. At the bottom of No. 3 shaft a bunch of fine ore was encountered which does not belong to the Ontario fissure proper. Nevertheless, it tends to show that at a depth of 2,000 ft. limestone formation has not been unfavorable to the deposition of ore.

"Drain tunnels Nos. 1 and 2 and the power house plant have been kept in usual repair, and have yielded more income than previously. Nothing has been done with the mill. The various auxiliary companies, from which the Ontario Company receives dividends, have made a good record. Their plants and business have been improved and are in first-class condition.

"Some years ago the Ontario Company acquired fractional interests in several mining claims about 3,000 ft. southeasterly from Shaft No. 2. Considerable development proved the existence of a strong vein, well mineralized, and carrying ores of high value. These claims were so situated, with reference to each other and to the vein, that all the owners decided it to be for their mutual benefit to consolidate their interests. This was accomplished in October by the incorporation of the Naildriver Mining Company upon a basis of 300,000 shares of capital stock. An ample working capital was provided by the sale of treasury stock at $2 per share. Work was begun as soon as possible to provide a hoist and machinery capable of sinking a shaft to a depth of 1,500 ft. The Ontario Company received 90,000 shares of capital stock and was accorded the management.

"Of the 25,922 net tons mined and sold, 24,678 tons came from the 1,500-ft. level and above, since no stoping was done below it. On December 31 all ore extraction was suspended. The ore remaining above the 1,500-ft. level was not yielding a profit sufficient to justify extraction under existing market conditions. Below that level so much of the ore has appeared to be of a concentrating grade that it was not expedient to begin extraction until it can be separated and treated according to its character.

"Notwithstanding the increase in certain classes of expense, due to deeper mining and to ore reserves diminishing above the 1,500-ft. level, the gross expenditures for the year are less than for 1901, except in the item of dead work. The receipts, howevere, were seriously impaired by the difference in grade of the ore, by a smaller tonnage, and by the steady fall in the price of silver. In 1901 our average sales price for silver was 58.17c. per ounce; in 1902, 52.30c. per ounce. The comparative loss on the value of silver alone amounts to over $60,000.

"The last two paragraphs clearly indicate the necessity of new methods and lower treatment cost to enable us to handle our ores with a reasonable profit. This involves a concentrating or other process for the low-grade ore, and a reduction of smelter and railroad charges on all products. The nature of the treatment to be adopted for the low-grade ore will be governed somewhat by the results of developments now in progress. It is believed that all of these questions can be disposed of satisfactorily during the present year."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Earthwork and its Cost. By Halbert Powers Gillette. New York; *Engineering News* Publishing Company. Pages, 244; illustrated. Price, $2.

The Michigan Technic. 1903. Ann Arbor, Mich.; published by the Engineering Society of the University of Michigan. Pages, 104; illustrated.

The Alternating Current Transformer. By F. G. Baum. New York; the McGraw Publishing Company. Pages, 196; illustrated. Price, $1.50.

Traite Theorique et Pratique des Moteurs a Gaz et a Petrole. Fourth Edition. Volume I. By Aime Witz. Paris, France; E. Bernard. Pages, 504; illustrated.

Twentieth Annual Report on Coal Mines in the State of West Virginia. 1902. James W. Paul, Chief Mine Inspector. Charleston, W. Va.; State Printer. Pages, 344.

National Association of Manufacturers. Proceedings of Eighth Annual Convention. 1903. Marshall Cushing, Secretary. Indianapolis, Ind.; published for the Association. Pages, 296.

Stones for Building and Decoration. Third Edition. Revised and Enlarged. By George P. Merrill. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 580; illustrated. Price, $5.

Civil Report of Brigadier-General Leonard Wood, Military Governor of Cuba. 1902. Volume I, II and III. Washington; issued by the Bureau of Insular Affairs of the War Department. Volume I, 780 pages; Volume II, 648 pages; Volume III, 240 pages; with maps, diagrams and illustrations.

BOOKS REVIEWED.

Foreign Trade Requirements. Second Yearly Volume, 1903. New York; Lewis, Scribner & Co. Pages, 532. Price, $10.

This publication contains a mass of facts compiled for the use of those engaged, or expecting to engage, in foreign trade. This information, which is arranged under the head of countries in alphabetical order, consists first of a brief summary of trade conditions, showing the various industries of the country, the goods which are most in demand, and the materials which the country produces, and those which it purchases from abroad. The second part, taking countries in succession in the same way, refers to the employment of traveling salesmen, local agencies and advertising. The other part refers to credit customs, and shows the business customs of each country, with regard to credits, customary times of payment and similar information. In addition to the comprehensive summaries heretofore noticed, there are others showing the commercial laws of the world, including trade laws, trade marks and patents, bankruptcy laws, tariffs and customs regulations. The transportation section shows the steamship lines by which access is gained to foreign countries, with notes regarding canals, railroads and other systems of internal communication in those countries. Postal regulations and tables showing foreign weights and measures, and the values of foreign kinds are also provided, in conclusion. Some 60 pages are devoted to a list of the principal commercial cities of the world, showing in the briefest possible form, their location, population, principal industries and trade.

It would be difficult to find a book more useful to the exporter, or containing a greater amount of information packed in a small compass; and it will certainly be of great value to those for whom it is designed.

Modern Machine Shop Tools. By William H. Van Dervoort. New York; Norman W. Hendley & Co. Pages, 552; with 672 illustrations. Price, $4.

This book is the outgrowth of a series of articles prepared by the author, for the students in machine shop practice at the University of Illinois; but in putting them into book form, they have been much enlarged and extended. The author has treated the subject generally in a clear and comprehensive manner avoiding unnecessary matter, and presenting to the apprentice and mechanic many points pertaining to the tools, with which they come in daily contact. About these it is often difficult to obtain the necessary information, to enable them to use the tools correctly, and with full appreciation of their purposes. The construction and proper care of machine tools are treated, as well as their uses; and there is much information also on the collateral subject of gearing, belting and other transmission machinery. The book covers a wide field, beginning with the earliest tools used by machinists—the hammer, the cold chisel and the file—and then treating successively of standard of measures, such as gauges, calipers and the like.

It then goes on to take up the several operations which are performed to the use of tools, beginning with turning and boring, including lathes, boring mills and similar tools; then planing with planers and slotting machines; then milling as performed on the various types of milling machines; next drilling, and lastly grinding.

The book is very fully illustrated, showing the arrangement, construction and methods of handling work on the different classes of tools. While the limits of space prevent too much discussion of the details of machine tool construction, the principal points are very well brought out, and the book must be of great assistance to the large class for which it is written.

L'Aluminum. Ses Proprietes—Ses Applications. By Dr. P. Moissonnier. Paris, France; Gauthier-Villars. Pages, 222; illustrated. Price (in New York), $2.50.

This book is a summary of our knowledge up to date on the subject of aluminum, its properties, the various methods of separating it and its uses. It opens with an historic account of our knowledge of the metal, its first discovery in separate form, and the various processes which have been devised for saving it. The minerals from which it is chiefly derived, such as cryolite and bauxite, and the preparation and purification of alumina occupy several chapters. The different methods of separating the metal chemical processes and by electrolytic processes are also described. The purification of the metal is a subject of another chapter, while methods of analysis and the determination of aluminum in alloys require still another section. Methods of working and soldering are discussed and a long chapter is devoted to the various alloys in which the metal has been usefully employed. One chapter is devoted to the special properties of aluminum and the possibilities of a future extension of its uses. These uses are then fully explained, together with the methods of working, and the effects of working on the properties of the metal. Many references are made to previous works on the subject, and to the

result of investigations made by different metallurgists. It appears to be, upon the whole, a fairly complete summary of our knowledge of aluminum.

A curious feature of the book is that the title-page is printed on a very thin sheet of aluminum, which is about the same thickness, and of less weight than a sheet of the paper upon which the book is printed. It is about the finest specimen of aluminum working that we have ever seen.

Geological Survey of Georgia. A Preliminary Report on a Part of the Granites and Gneisses of Georgia. By Thomas L. Watson. Atlanta, Ga.; State Printer. Pages, 368; illustrated.

This excellent report, forming Bulletin No. 9 of the Geological Survey of Georgia, gives the results of a study of part of the granites and gneisses of the State. These are found mainly in that section north of a line drawn from Augusta through Macon to Columbus; they cover an extensive area, but have been opened or quarried in comparatively few places.

The report is divided into, and treated in, six chapters. Chapter I discusses the physical and chemical properties, varieties, geological age, mode of occurrence, history and uses, and origin of granites in general; also, the general and geological and geographical distribution of granites in the United States, with special reference to those of the Atlantic border region. Chapter II treats of the general physical, chemical and economic properties of building stones, as relating more especially to granite rocks. In the preparation of this part of the report, free and liberal use has been made of the following valuable publications, bearing on the subject, namely: "Stones for Building and Decoration," by George P. Merrill; "The Physical, Chemical and Economic Properties of Building Stones," by Geo. P. Merrill, and "Building and Ornamental Stones of Wisconsin," by E. R. Buckley. All references to other publications used are made in the text.

In Chapter III, Part 1, the general geology and physiography of the Georgia portion of the Piedmont plateau is described. Part 2 gives a general description of the individual properties by counties, including the occurrence, the chemical and mineral compositions, and the physical tests, of the Georgia granitic rocks.

Chapter IV includes the general study of the chemic and lithologic characteristics and the correlation of the Georgia granitic rocks.

Chapter V, Part 1, contains a statement and discussion of the general principles of rock-weathering. In the preparation of this part of the report, unlimited use was made of the published papers on this subject, by Dr. Merrill, in the *Journal of Geology*, and the *Bulletin* of the Geological Society of America; and in his book, entitled "Rocks, Rock-Weathering and Soils." Part 2, of Chapter V, contains a detailed study of the changes and processes, involved in passing from fresh and decayed rock (weathering) as especially applicable first, to the granites; second, to the porphyritic granites; and, third, to the granite gneisses, occurring in Georgia. Chapter VI concludes with tables of statistics, physical tests and chemical analyses of the Georgia granitic rocks.

The map accompanying this report, on which is delineated the areas of granite and gneiss, does not include all the areas of these rocks in the State; but only the areas, studied by the writer in the field and described in the text, are shown. A similar detailed field-study of the remaining counties, which contain granites and similar rocks, will, of course, add to the areas given on the map, and will likely result in the extension of those here studied. The writer has made a reconnaissance of several granite areas, not shown on the map; but he has not attempted to give them, for the reason that they have not been studied in sufficient detail and their boundaries accurately enough traced in the field to warrant their granites and gneisses, for the reason that the gneisses studied and reported on in this volume are believed to be true granite-gneisses; that is, derived from original intrusive granites.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the MANAGING EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Butte Miners and the President.

Sir.—It is with some surprise that I note the article enclosed, clipped from the New York *Sun* of June 25, 1903.

In the face of the notorious disregard for law and order manifested by the "Western Federation of Miners" wherever they establish their union, I feel that there must be some mistake. Can you throw any light on the subject? It cannot be that the President of the United States is going to receive and entertain these "misguided" socialists.

MINING ENGINEER.

Nova Scotia, July 3, 1903.

(We are glad to observe from Oyster Bay dispatches that the President does not expect the gentlemen from Butte to visit him there, the invitation to come and see him being of a general kind and referring mostly to the sights of the capital, more especially the Washington Monument, which it would be a good thing for the Western Federation of Miners to stare at for an hour or so, in the hope that they may derive from it a suggestion of the kind of equality of opportunity for which the First President lived and labored.—EDITOR.)

From New York *Sun*, June 25.

BUTTE, Mont., June 24.—Six representatives of organized labor in Butte will leave on July 2 for Washington on a visit to President Roosevelt as his guests. The representatives are Malcolm Gillis, of the Stationary Engineers; G. W. Dempster, of the Mill and Smeltermen's Union; M. R. Dempsey, of the Miners' Union; J. McNally, of the Carpenters'Union; Frank Doyle, of the Workingmen's Union, and Harry Heimerdinger, of the Clerks' Union. They served on the reception committee to President Roosevelt when he visited Butte, representing the labor unions, and the President was so much impressed with the organized labor of Butte that he extended an invitation to the men to visit him at Washington and be his guests. The invitation has been accepted, and the trip just arranged through Secretary Loeb.

From the ENGINEERING AND MINING JOURNAL, June 6.

During the past week the annual conventions of the American Labor Union and the Western Federation of Miners, one of its auxiliaries, have been held in this city. In the latter there were 110 delegates. In addition to Socialism, which the Federation of Miners is pushing as an ultimate solution of all so-called labor problems, the convention dealt with the establishment of co-operative mining, with the Standard Mill strike at Colorado City, with the purchase or erection of a large office building in Denver, and with a general 8-hour law. President Moyer, in his official address, declared for a universal 8-hour day, and recommended that the convention select a date in the near future when no member should work more than 8 hours. He arraigned the late Colorado legislature for its failure to pass an 8-hour law. He also recommended a co-operative mine. Among other things he said: "No permanent relief to the wage workers can be brought about through trades unionism," and "as labor produces all wealth, such wealth belongs to the producer thereof."

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

MEXICAN TARIFF ON FERROMANGANESE.—United States Consul W. W. Canada reports from Vera Cruz, June 8, 1903, that the Mexican Government has reduced the import duty on ferromanganese with the view of encouraging the manufacture of steel by modern methods in the Republic. Ferromanganese containing 25 per cent or more of manganese was formerly subject to a customs duty of $5 per 100 kilograms (5c. silver, or about 2.25c. gold, per 2.2 lb.) gross weight; the new rate of duty has been fixed at $1.50 per 100 kilograms (1.5c. silver, or 0.67c. gold, per 2.2 lb.) gross weight.

RECOVERING TIN FROM SCRAP.—In Germany 30,000 tons of tin-scrap are now worked up annually in seven factories operating the electrolytic process, metallic tin being recovered. Although the use of other electrolytes has been proposed and patented, sodium hydrate is stated to yield the best results. In Austria one tin recovery works is stated to be in operation; and England possesses one small experimental plant at Manchester. Germany at present is drawing supplies of scrap for the seven works referred to from England, France and Switzerland, the home supply proving insufficient to meet the requirements of the works. This state of things is unlikely to continue, says the London *Iron and Coal Trades Review*, and it is evident that a well-situated electrolytic recovery works, with a good organization for the collection and transport of the scrap and cuttings, is demanded, and will some day be found in operation.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Iron Silicate.—Of what commercial value is iron silicate? There is a large deposit of it near here, and on a railroad line.—A. G. F.

Answer.—Are you quite sure of the nature of the deposit? Iron silicate does not frequently occur in nature, and, when found, it is usually in small quantities. It has no special commercial value.

Arsenic.—We have some ore that will go 7 per cent in arsenic. Is there any market for such ore, or for the refined product?—C. S. M.

Answer.—The market for arsenic ore would depend entirely upon its nature; that is, upon the other constituents of the ore. At present, ores containing arsenic are worked at the mines. There are few concerns buying the raw ore. The largest supplies come from Canada and Germany. As to the market for refined arsenic, it is good. There is a demand for it in manufacturing colors, and in making poisons for insects—such as the potato-bug.

Garnet.—I have a deposit of garnet, ruby red and jet black, the grains varying in size from 1-8 in. to 1-32 in., near abundant supply of red fir and water power. Can you refer me to dealers or people who would be willing to work the deposit? I think the garnet can be delivered at San Francisco at about $15 a ton.—J. W.

Answer.—Apparently you have a good deposit of garnet, but as the annual consumption in the United States is only about 4,500 or 5,000 tons, which is readily supplied by the mines in the Adirondack Region of New York, and those of Pennsylvania and North Carolina, you will likely experience some difficulty in interesting capital in your property in Cali-

fornia. Garnet is used principally as an abrasive in the manufacture of boots and shoes and for wood-working purposes. A small quantity is also employed instead of emery for grinding brass, and experiments have been made with a mixture of garnet and emery in the manufacture of emery wheels, but without much success. The value of garnet varies with its quality, from $25 to $60 per short ton, f.o.b. New York; but the average grade sand sells around $35. Leading dealers are Herman Behr & Co., 75 Beekman Street, New York City, and Baeder, Adamson & Co., 67 Beekman Street, New York.

Kaolin.—Can you tell me if there are any kaolin deposits in the West now being worked on a commercial scale? What would be the nearest market to a deposit in Wyoming? Is there a good demand for this product, and is it only saleable after impurities have been removed?—S. A. E.

Answer.—Considering that the principal consumers of kaolin are the pottery works at East Liverpool, Ohio, and Trenton, New Jersey, and that the demand is readily met by the output by the Pennsylvania, New Jersey and other Eastern States, and also by imports at a low ocean freight, it would hardly be profitable to develop Western deposits. The high rail freight to consuming markets is responsible for this. Kaolin is valued according to its quality, the whiter the higher the price, though only two grades are known in the trade—common and best—that sell ex-dock, New York, at $8.25 to $9.25 per long ton for the domestic, and $10.50 to $16.25 for English. The big difference in the prices for foreign kaolin may be explained by its superior quality and adaptability. The finer grade of mineral is also employed in the manufacture of paper. Prominent dealers are Hammill & Gillespie, 240 Front Street, New York City, and Moore & Munger, 159 Front Street, New York.

Gypsum.—Are you acquainted with the methods and cost of manufacturing wall plaster from gypsum? Can you refer me to articles on this point? Are gypsum beds of sufficient size and quality for this purpose found in the United States? What are the qualities required in gypsum for the manufacture of good plaster? Would a large bed of gypsum, 78 per cent pure and located on a railroad line, about 1,200 miles from Chicago be valuable?—C. H. W.

Answer.—1. Articles on the preparation of gypsum for plaster and other uses have been published in "The Mineral Industry," especially Volumes IV and V. Prof. G. P. Grimsley, of the University of Kansas, at Lawrence, Kan., has also written a valuable monograph on this subject, which was published by the Geological Survey of Kansas.

2. Gypsum is found in many places in the United States. The chief commercial supply comes from New York, Michigan and Kansas. It is also found in Ohio, Illinois, Missouri, Utah, California, and in some other States.

3. The requisites of good gypsum are freedom from earthy and other impurities. An important point is that it should be free from iron oxide, which spoils the color, causing irregular stains.

4. It is impossible to say what the value of a deposit would be. It depends partly on quality; more on local demand. The value of the material is not high enough to stand heavy transportation charges. The Kansas and Michigan deposits are much near to consuming points than those you mention.

Tapping a Chilled Furnace.—In a circular forehearth, your bar in the tap hole, having been taken out, and no matte comes, owing to it having chilled beyond. What method is there of tapping your matte? Hand drilling being useless.—H. D. M.

Answer.—Assuming that it is matte which has chilled in the tap-hole, a coal-oil blow-pipe might be used to soften or melt out the mass. This apparatus is described in the *Transactions* of the American Institute of Mining Engineers, Vol. XV, page 417. "Note on the Opening of a Chilled Hearth with the Coal-oil Blowpipe." The author writes: " . . . the troubles culminating suddenly one morning in a chilled hearth, solid from the bottom to the tuyeres with the exception. . . . I decided to use the coal-oil blowpipe; the intention being to cut a hole from the iron-notch up to the tuyeres. . . . In four hours' time from starting the hole was made and air from the tuyeres was blowing out of the iron-notch." In the paper the construction of the apparatus used is shown.

The same effect can be produced with the oxy-hydrogen blowpipe, which is also employed to remedy certain blast-furnace troubles.

There is a compound known as "thermit," consisting chiefly of powdered aluminum and oxide of iron, which might be used for this purpose. It is claimed for this substance that "it is possible to apply at a small cost a heat of an intense nature at any required spot without the aid of machinery or costly apparatus. . . . Thermit may also be used for softening armor-plates, at any point it may be desired to drill the same." A description of this substance—giving the uses to which it may be applied—is contained in the ENGINEERING AND MINING JOURNAL of August 25, 1900. Thermit is manufactured by the Chemische Thermo-Industrie, Limited, of Essen-Ruhr, Germany.

To prevent troubles of this nature, it is best to employ a large copper block (say, 18 ins. square and 4 ins. thick) with tap-hole drilled in center. These blocks may be cast from converter-copper at the works. After the matte has been tapped, a steel bar can be driven into the hole, and left there until the next tapping. It is best to avoid water-cooled matte-taps, though a block of the nature referred to may be sprayed when occasion requires it.

PATENTS RELATING TO MINING AND METALLURGY.

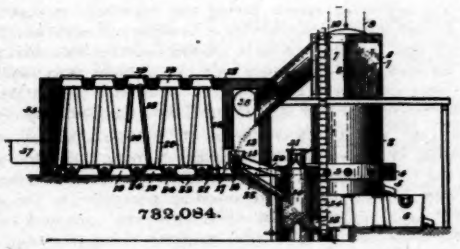
UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending June 30, 1903.

732,047. ELECTRODE.—William R. Chipman, New York, N. Y. An electrode for use in the purification of liquids by electrolysis, consisting of nickel and a substance which acts as a producer of oxyhydrates and as a binder.

732,084. SMELTING PLANT.—Walter E. Koch, Pittsburg, Pa., assignor, by mesne assignments, to United States Sulphide Furnace Company, Toledo, Ohio. The combination



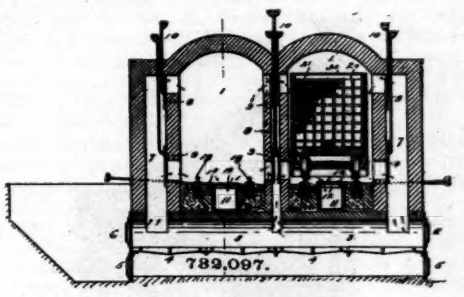
with a stack smelting-furnace of a dust-catching chamber connected with the offtake of said furnace, a fritting-furnace adjacent to and arranged to receive the heated material from the dust-catching chamber and mechanism for feeding fuel into the fritting-furnace in contact with the heated material.

732,110. FEEDING DEVICE FOR FORGE-HAMMERS.—Peter R. Peiseler, Remscheid, Germany. In a forging-machine a feeding or turning device for the blanks, comprising a bed, a spindle arranged therein having a chuck, adapted to receive and hold a ratchet mechanism and a chain-gear to turn intermittently the spindle, a spring-bolt and a brake to regulate the turning, means to adjust the strain of the chain and means to reciprocate the spindle.

732,118. MACHINE FOR CUTTING PRECIOUS STONES.—Ernest G. H. Schenck, Orange, N. J. In a machine for cutting a precious stone in combination, a cutting device adapted to notch said stone, a thin splitting device, a holder for said stone, said holder being relatively movable from one to the other of said devices, and means to accurately aline said notch with said splitting device, said holder and devices being movable relatively toward each other to move said stone against said devices in turn, and means whereby said stone may be rotated in said holder on an axis at a right angle to the plane of said notching device, to present another portion of said stone to said device.

732,119. METHOD OF CUTTING PRECIOUS STONES.—Ernest G. H. Schenck, Orange, N. J. A method of treating a precious stone which consists in cutting a sloping sided notch in opposite sides of the girdle of said stone, the bottom of said notch lying in the plane of the girdle, and cutting through said stone from the bottom of one notch to the bottom of the other notch and parallel with the girdle, whereby the sloping sides of said notches form facets of the divisions of said stone after the stone is divided.

732,097. COKING-KILN.—Caspar W. Mettler, Adolf Mettler, and Jacob Mettler, New Haven, Conn., assignors to Frederick C. Rockwell, West Hartford, Conn. A kiln having a coking-chamber, a furnace under one end of the coking-



chamber, flues extending from the combustion-chamber of the furnace to the top of the coking-chamber, a flue extending from the bottom of the coking-chamber to the stack and a holder with closed sides, ends and top and open bottom, adapted to be moved into and of the coking-chamber.

732,149. GOLD-SEPARATOR.—Benjamin Westhaver, Mahone Bay, Canada. A separator described comprising a dump-box, a chute or sluice-box, removable, plain-surface sections arranged in the chute or sluice-box, and having rabbets removable riffle bar sections arranged in the chute or sluice-box, alternately with the plain-surface sections, and flush with said plain-surface section and the bottom of the dump-box, said riffle-bar section each having a bed-plate, and parallel, transverse riffle-bars, the upper and lower sides of which are straight, and also having riffles, between the bars, the bottoms of which riffles are straight and parallel to the surfaces of the riffle-bars, the upper and lower sides of the bars being inclined in a common direction from the riffle-bottoms, the upper sides in a less degree than the lower sides, whereby spaces of acute-angle shape are formed between the riffle-bottoms and the upper sides of the riffle-bars to retain gold, and the riffles are rendered wider at the top than at the bottom to permit of the free escape of pebbles and the like, retaining-strips bearing on the bottom of the dump-box, in the rabbets of the plain-surface sections and on the riffle-bar sections at the ends of the riffle-bars, and pins removably securing said strips in the chute or sluice-box.

732,172. EXCAVATING MECHANISM.—Walter Cole, Olympia, Wash. An excavating apparatus comprising removable supporting-frames located a predetermined distance apart, an inclined trackway suspended therebetween, excavating scuppets or scoops, means for drawing the scuppets or scoops against the earth so as to load same and elevating the filled excavating scuppets or scoops and placing the same onto the suspension-trackway, means adjustably connected to the trackway for regulating the length of cut for the scuppets or scoops, and devices located at the lower end of the trackway for causing the scuppets or scoops to automatically discharge the excavated material carried thereby when said end of the trackway is reached.

732,173. EARTH-BREAKING APPARATUS.—Walter Cole, Olympia, Wash. An earth-breaking apparatus comprising a drag provided with a series of cutting-teeth having chisel-points and the remaining teeth having pick-points, a haulage-cable for the drag, a swivel-hook connecting the drag to the said cable; and means whereby the cable is operated to draw the drag over the earth to be broken.

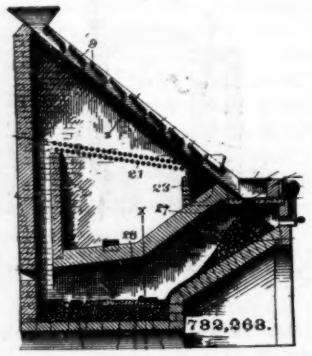
732,206. WELL-DRILLING MACHINE.—Daniel B. Martin, Rittman, Ohio. A well-drilling machine, comprising a base-frame suitably mounted and provided at its front with upright arms or beams forming a derrick or ladder, upright arms or beams mounted at the rear of the base-frame, brace-arms connecting said upright arms or beams to the upper portion of said upright arms or beams of the derrick, arms pivotally attached at their rear ends to said upright arms mounted at the rear of the base-frame, and carrying at their front ends a spudder-pulley adapted to take over the lower side of the drill-rope, a pitman-arm pivotally attached to said last-mentioned arms and connecting the same with the crank arm formed with the shaft

mounted to the base-frame whereby said arms and spudder-pulley are given an oscillating motion.

732,218. PROCESS OF SEVERING BARS OF METAL.—Walter R. Pearson and Charles E. Roberts, Chicago, Ill. A process of severing a bar of metal consisting in partially severing said bar by a groove, the bottom of which is angular or V-shaped and in then turning the sections of said bar on opposite sides of the point of partial severance relatively to each other upon their common axis.

732,226. COMPOSITION OF PAINTING-CEMENT.—Johann Senft, Vienna, Austria-Hungary. A composition of painting-cement quickly drying and rendering the ground color superfluous, consisting of white lead, pure litharge, polishing-varnish, bone-glue, turpentine-oil, potassium silicate, siccative, rock-lime and water in the proportions specified which ingredients are to be ground to pulp in a color-grinder.

732,263. METALLURGICAL FURNACE.—Martin P. Boss, San Francisco, Cal., assignor to the Hydro-Carbon Smelting Company. In a metallurgical furnace, the combination of a chamber provided with an inclined hearth, means located in the upper portion of said chamber for heating



said chamber, a second chamber having a horizontal hearth connected to the lower end of the inclined hearth, means locatel in said chamber for heating said chamber, and an exit-flue leading from the second chamber and situated opposite to the point of connection of the two chambers.

732,264. METALLURGICAL FURNACE.—Martin P. Boss, San Francisco, Cal., assignor to the Hydro-Carbon Smelting Company. A metallurgical furnace, comprising in its construction an inclined calcining-chamber, an inclined reducing-chamber, a horizontal oxidizing-chamber, said chambers connected together at progressively lower levels, means for producing the required atmospheres in said chambers, and a continuous roof for said chambers having channels therein through which cooling-bodies may be transmitted.

732,265. METALLURGICAL FURNACE.—Martin P. Boss, San Francisco, Cal., assignor to the Hydro-Carbon Smelting Company. A metallurgical furnace comprising a chamber, means for creating a reducing atmosphere in said chamber, a second chamber connected to the first-named chamber, means for creating an oxidizing atmosphere in said chamber, the said means for creating the required atmospheres having such a location relative to the hearths and tops of said chambers that gaseous flames may be freely developed within such chambers without contact with the material under treatment within the chambers.

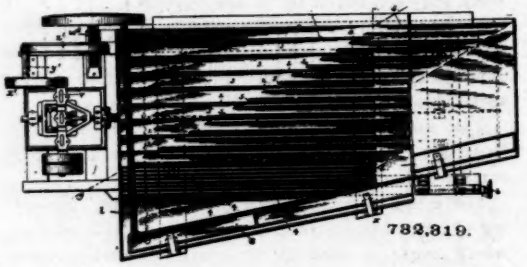
732,266. METALLURGICAL FURNACE.—Martin P. Boss, San Francisco, Ca., assignor to the Hydro-Carbon Smelting Company. A metallurgical furnace comprising in its construction a calcining chamber having an inclined hearth, a reducing-chamber connected to the lower end of the calcining-chamber, having an inclined hearth, and its interior at its upper end of considerable vertical height, an oxidizing-chamber having its bed or hearth extended backward into and connected with the hearth of the reducing-chamber, and means for producing the required atmosphere in said chambers.

732,267. METALLURGICAL FURNACE.—Martin P. Boss, San Francisco, Cal., assignor to the Hydro-Carbon Smelting Company. A metallurgical furnace, comprising a chamber, means for creating a reducing atmosphere in said chamber, a second chamber connected to the first-named chamber, a supplemental bed located upon the hearth of said chamber, means for creating an oxidizing atmosphere in said chamber, and means for delivering an air-blast above the hearth of said oxidizing-chamber and below the normal level of the melted metal discharged into said chamber.

732,268. METALLURGICAL FURNACE.—Martin P. Boss, San Francisco, Cal., assignor to the Hydro-Carbon Smelting Company. In a metallurgical furnace, the combination in a furnace structure, of chambers provided with means for calcining, reducing and oxidizing the metal under treatment, a removable hearth in the oxidizing-chamber, and means for supplying said hearth with air-currents.

732,269. METALLURGICAL FURNACE.—Martin P. Boss, San Francisco, Ca:. assignor to the Hydro-Carbon Smelting Company. The combination with a metallurgical furnace, of a removable hearth provided with means for tilting the hearth within the furnace.

732,319. ORE-CONCENTRATOR.—Edward B. Rogers and Fredrick P. Hanson, San Francisco, Cal. A laterally-inclined, vibrating ore-concentrating table having its surface divided by riffles extending longitudinally thereof, and in the general direction of the vibratory movement, the riffles at the high end of the table being arranged uni-



formly close together for a short distance, the remaining riffles upon the table being arranged uniformly comparatively far apart, and intermediate riffles arranged to extend from a line extending diagonally across the surface of the table, over the portion thereof containing the widely-arranged riffles.

732,326. TUNNELING-MACHINE.—Pedro Unanue, Mexico, Mexico. In a tunneling-machine, the combination of a ram-head provided with a series of rammers having their rods inclined to the ram-head in and toward the direction of revolution of the ram-head together with an inclination from the axis of revolution of the ram-head, and means for rotating and feeding said ram-head.

732,348. DUMPING-CAR.—Albert D. Harrison, Detroit, Mich. The combination with a car having a discharge-door, of a compressed-air cylinder, a toggle connected to the door, and a chain connecting the piston-rod of the cylinder and the toggle.

732,410. MANUFACTURE OF SILICON AND ALUMINUM FROM SILICATES OF ALUMINA.—Christian H. Homan, Christiana, Norway. A method of treating materials containing silicates of alumina for the purpose of obtaining silicon and other valuable products consisting in mixing the materials with so much of a reducing agent that the silicic acid and basic impurities in the material may be reduced, but leaving the aluminum oxide unreduced, heating the mixture so that such reduction takes place and tapping off the products obtained separately.

732,471. MACHINE FOR MAKING CONCRETE.—George S. Tiffany, Tecumseh, Mich. In a concrete-mixing machine, the combination of a transportable platform, a mixing-cylinder mounted upon said platform, mechanism also mounted upon the platform for rotating said cylinder, means for lowering and raising said platform carrying said mixing-cylinder and driving mechanism to allow the platform to rest upon the ground when the machinery is in operation and to be raised from the ground while the apparatus is being transported.

732,490. ROLLING-MILL.—Raymond D. York, Portsmouth, Ohio. In a rolling-mill, the combination with a vertical roll, of a series of antifriction-rollers traveling in a recess part of which is concentric with the roll and the remainder of which is wholly beyond the roll, the said antifriction-rollers in the concentric portion of the recess forming an arc of sufficient length to afford a bearing both at the back of the roll and laterally thereof.

732,499. APPARATUS FOR HOISTING AND CONVEYING.—Leonard S. Austin, New York, N. Y. A hoisting and conveying system having two conveyers arranged for certain leads thereof to run in proximity to each other, one of said conveyers being a loading-conveyer and delivering its load from the under side of its lower lead, and the other conveyer being arranged for an end portion thereof to receive the load so discharged from the loading-conveyer.

732,538. DREDGER.—William H. Fulcher, Oakland, Cal., assignor of one-half to Herman Murphy, San Francisco, Cal. The combination in a dredger of a suction apparatus and a chain of buckets traveling proximate to the inlet of said apparatus said buckets having open-work grids to allow the finer material to enter the suction-pipe and to arrest the coarse material.

732,545. HOT-COKE CONVEYER.—Maurice Graham, Leeds, England. A hot-coke conveyer, consisting of a conveying device adapted to receive and carry heated coke, a housing inclosing said conveying device and adapted to permit the passage of the same therethrough an exhaust-pipe connected with said housing, and a suction device connected with said exhaust-pipe.

732,571. SCRAPER ATTACHMENT FOR HOIST APPARATUS.—Samuel E. Leonard, Ashtabula Harbor, Ohio. In means for unloading loose freight from the holds of vessels, a scraper to draw the freight within reach of a bucket comprising a pair of wings and a support on which said wings are pivoted at their inner ends, and cables connecting with said wings between their ends.

732,574. ARTIFICIAL FUEL AND PROCESS OF MAKING SAME.—Eugene C. May, Chicago, Ill. A process of making fuel from garbage, which consists in crushing the garbage, adding calcium chloride thereto, drying the substance thus formed, and adding a saponaceous substance to the dried residue.

732,605. PROCESS OF LEACHING ORES.—Gustav E. Thede, Havilah, Cal. A process of leaching ores which consists of mixing with the ore a metallic oxide and treating said mixture in a cyanide solution containing an oxide of reducing said metallic oxide.

732,616. METHOD OF APPLYING HEAT TO ELECTROLYTES.—Charles F. Burgess and Carl Hambuechen, Madison, Wis. A method of applying heat to electrolytes which consists in imparting heat to one or more of the terminals by including the same in an electric circuit distinct from the electrolyzing-circuit.

732,639. GOLD-EXTRACTING PROCESS.—Thomas B. Joseph, Mercur, Utah. A process of extracting gold and silver from ore containing the same, when in a suitable condition, which consists in subjecting the said ore to the leaching action of a solution containing water, cyanide of potassium, bromine, hydrate of calcium, peroxide of barium and carbon dioxide, and simultaneously agitating the ore, by compressed air being forced upward through the same.

732,640. CEMENT.—Thomas B. Joseph, Salt Lake City, Utah. A cement containing calcined sulphate of calcium, combined with water, arsenic acid, peroxide of barium and chloride of ammonia.

732,641. METAL-LEACHING PROCESS.—Thomas B. Joseph, Salt Lake City, Utah. A process of extracting metals from ore containing the same while in a suitable condition, which consists in subjecting the said ore to the leaching action of a solution containing water, sulphuric acid, chloride of sodium, nitric acid, permanganate of potassium and hyposulphate of sodium, and subsequently precipitating the metals from the solution.

732,674. ARTIFICIAL STONE.—Joshua A. Bell and Lynn T. Leet, Montreal, Canada, assignors to Composite Stone and Brick Company. The process of making artificial stone consisting in mixing the constituent ingredients, adding a liquid, forming the mixture into articles of desired shape, partially steam-indurating the same, saturating them with water, removing the water, and then completing the steam induration.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending June 13, 1903.

14,058 of 1902. DISCHARGING COKE-OVENS.—Wellman Seaver Morgan Company, Cleveland, Ohio. Improved method of compressing coal and charging and discharging coke ovens.

14,936 of 1902. ALUMINUM-IRON ALLOY.—H. Warrington, Stoke. Making an alloy of aluminum and iron, of great tensile strength, by enclosing alumina in an envelope of wrought iron and rolling.

15,128 of 1902. ELECTRO-DEPOSITION OF ZINC.—Columbus Electricity Company, Ludwigshafen-on-Rhine, Germany. In the electrodeposition of zinc on sheet metal, improved method for keeping the anode and cathode at equal distance and of reducing the distance in order to decrease the resistance.

15,222 of 1902. PURIFYING COPPER MATTE.—F. B. Stone, London. Freeing copper matte from arsenic and antimony by mining with iron or copper and heating in a reverberatory furnace at a temperature just below liquifaction.

15,561 of 1902. BALL MILL.—J. Konegan, Branschweig, Germany. A ball mill in which the balls move on a horizontal plane and press by centrifugal force on a vertical crushing surface.

1,519 of 1903. BRIQUETTING IRON ORES.—O. Dobbelstein, Soarbrucken, Germany. Improved method of utilizing fine iron ores for the blast furnace, by making them into briquettes with a coking coal, which being coked reduces the iron.

2,089 of 1903. CINDER CAR.—E. A. Weimer, Lebanon, Pa., U. S. A. Improvement in the inventor's cars for carrying molten cinder from blast furnaces and smelters.

3,629 of 1903. ELECTRIC FURNACE.—The Acheson Company, Niagara Falls, U. S. A. Electric furnace process for producing a silicon-carbon-oxygen compound useful as a refractory material.

6,412 of 1903. CRUSHING ROLLS.—C. Suttie, Onehuga, New Zealand. A crushing machine with rollers on a circular chamber, on which the pressure of crushing may be increased or decreased at will.

7,530 of 1903. LIGHTING MINERS' LAMPS.—B. D. Williams, Glamorgan. Improvement in the inventor's method of electrically igniting miners' oil lamps.

7,693 of 1903. TREATING ZINC ORES.—C. W. Sexton, Brooklyn, U. S. A. In treating zincky ores, first calcining, then in the distilling of the zinc, adding iron, which catches the precious metals, the agglomerated particles being then amenable to magnetic extraction.

7,911 of 1903. ROCK-DRILL.—Duisberger Maschmenban, A. G., Duisberg, Germany. Method of arranging the feed nut of percussive rock drills so as to decrease the wear and tear due to exposure to the dust.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mr. H. A. Keller is at San Francisco.

Mr. John A. Church has returned from Arizona.

Mr. Edward Skewes is now at Hayle, Cornwall.

Mr. J. Henry Devereux has returned to Aspen, Colo.

Mr. Charles A. Molson has returned to Salt Lake City.

Mr. Noble C. Banks was at Nogales, Ariz., last week.

Mr. E. Nelson Fell has returned to London from Siberia.

Mr. Fred H. Perkins, of Salt Lake City, is now in Montana.

Mr. H. De C. Richards, of Orleans, Cal., is in New York.

Mr. Ernest A. Wiltsee has returned to New York from Mexico.

Mr. Alliene Case, of Ville Marie, Quebec, was in New York on July 3.

Mr. John Stanton left for the Lake Superior copper mines on July 11.

Mr. Arthur S. Dwight returned from Europe on the *Teutonic* on July 2.

Mr. M. M. Green, from Grand Encampment, Wyo., has been in New York.

Mr. Arthur Winslow, of Kansas City, will be at Telluride during July.

Mr. W. Renton Ingalls, of Boston, was in New York during the week.

Mr. George S. Scott, of the *Mining World*, Chicago, is in New York City.

Prof. Raphael Pumpelly, who is exploring Turkestan, has arrived at Tashkend.

Mr. James W. Abbott was at Durango, Colo., last week, and is now at Denver.

Mr. R. W. Petre, of Baltimore, has recently returned from Sonora, Mexico.

Mr. W. L. Austin, of New York City, has returned from Cananea, Mexico.

Mr. Harold A. Titcomb, of Denver, is taking a well-earned holiday in England.

Mr. C. C. Burger, a mining engineer, of New York City, is now at Clifton, Ariz.

Dr. James Douglas, president of the Detroit Copper Company, is now at Morenci, Ariz.

Mr. William Griffith, of London, will inspect the Associated Northern Blocks at Kalgoorlie.

Mr. W. B. Devereux is at Glenwood Springs, Colo., where he will remain for three months.

Mr. W. G. Scott has been appointed superintendent of the Continental-Alta properties at Alta, Utah.

Mr. Victor G. Hills, of Cripple Creek, Colo., has been appointed manager of the St. Patrick Mine.

Mr. E. G. Spilsbury has returned to New York from the Smoky Range Mountains, North Carolina.

Mr. J. P. Evans, of the Colorado Iron Works, recently returned to Denver from San Francisco, Cal.

Mr. Waldemar Lindgren, of the United States Geological Survey, is going to Australia at the end of July.

Mr. Ralph Nichols has been appointed consulting engineer to the South Kalgurli Mine. He is also general manager of the Boulder Perserverance, at Kalgoorlie.

Prof. Mark Ehle, Jr., of the South Dakota School of Mines, has gone to Aspen, Colo., with a party of students.

Mr. Hennen Jennings, consulting engineer to Wernher, Beit & Co., has returned to London from Johannesburg.

Mr. Frank J. Buck, of Denver, Colo., has been appointed consulting engineer for the San Miguel Copper Company.

Mr. John A. Groesbeck, Sr., left Salt Lake, Utah, recently for Peru, to manage mining property for Mr. A. W. McCune.

Mr. Philip Argall and Mr. Chester W. Purington have returned to Denver from a professional journey to Nevada and Idaho.

Mr. George A. Schroter passed through Denver on his way to New York, after eight months of professional work in Mexico.

Mr. Camille Mercarder, of the Homestead Steel Works, of the Carnegie Steel Company, has returned from a tour in Europe.

Mr. William E. Ford, Jr., of the Sheffield Scientific School, Yale University, has gone to Colorado to study ore deposits there.

Mr. J. W. Mercer, general manager of the South American Development Company, of New York City, was in Colorado last week.

Mr. Andre E. Sayous, a French engineer, is touring the mining camps of Arizona and New Mexico for the Paris Board of Trade.

Mr. J. F. Healy, late acting general superintendent of the Davis Coal and Coke Company, has been appointed general superintendent.

Mr. F. Archibald, of London, Eng., representing the Tharsis Sulphur and Copper Company, has been visiting mines near Clifton, Ariz.

Prof. George A. Koenig, of the Michigan School of Mines, at Houghton, has been visiting Leadville and other points in Colorado.

Dr. A. H. Elftman, of Minneapolis, is in the Salmon River District, Idaho. He will be at Silverton, Colo., during the latter part of July.

Mr. G. J. Young, professor of metallurgy at the University of Nevada, will assist Dr. Louderback in geological work near Lovelock, Nev.

Mr. F. C. Lincoln, formerly of Colorado, has been appointed professor of mining at the New Mexico School of Mines at Socorro, N. Mex.

Mr. W. L. Maas, of St. Paul, has taken up his residence at Salt Lake City. At present he is at Yreka, Cal., on professional work.

Mr. S. F. Emmons, of the United States Geological Survey, sails for Europe about July 21, to attend the Geological Congress at Vienna.

Mr. David Cole, of Aspen, Colo., has been appointed superintendent of the concentrator of the Cananea Copper Company, at La Cananea, Mexico.

Mr. Robert B. Brinsmade, of St. Louis, has accepted a position as metallurgical engineer with the Semet-Solvay Company, at Syracuse, N. Y.

Mr. F. A. Keith has been appointed general superintendent of both the mines and mill of the Bamberger-De La Mar Mines Company, at De Lamar, Nev.

Mr. W. H. Thomas, consulting engineer for the British Columbia Copper Company, has returned to New York after a two months' stay in the district.

Mr. J. M. L. Henry, formerly of California, is now in London. He has been engaged for some years past as mining engineer at Johannesburg and Rhodesia.

Mr. Henry W. Hill, of Coolgardie, Western Australia, has returned from an inspection of the mines at Winneckes Depot, in the Arltunga District, South Australia.

Mr. Karl Eilers, of New York, has gone to Salt Lake City on important work connected with the Murray plant of the American Smelting and Refining Company.

Mr. H. C. Bosworth, manager of the Denver Fire Clay Company, of Denver, Colo., is making a tour through California, Oregon, Washington and British Columbia.

Mr. A. H. Danforth, formerly with the Colorado Fuel and Iron Company, of Denver, Colo., is now manager of the Hidden Fortune Mining Company, near Deadwood, S. Dak.

Mr. George H. Dern, general manager of the Consolidated Gold Mines Company, of Utah, attended the stockholders meeting at Jersey City, July 6.

Mr. H. N. Bowen, who has been superintendent of the Aberdeen Copper Company, Lordsburg, N. M., for the past year, has resigned to accept a position with a Utah company.

Mr. F. McNair, president of the Michigan School of Mines, at Houghton, Mich., has returned from a tour through the West, visiting various metallurgical and milling plants.

Prof. H. L. Fairchild, secretary of the Geological Society, sailed for Europe on June 27, to attend the International Geological Congress at Vienna the latter part of August.

Mr. H. C. Ives, instructor in Worcester Polytechnic Institute, Worcester, Mass., has been appointed assistant professor of civil engineering in the University of Pennsylvania.

Mr. R. P. Jarvis, late superintendent of the Compania Metalurgica de Torreon in Mexico, has been appointed professor of mining at the New Mexico School of Mines, at Socorro, N. Mex.

Mr. Frank A. Janney, constructing engineer and superintendent of the Bamberger-De La Mar mill, at De Lamar, Nev., has been appointed to a similar position with the Utah Copper Company.

Mr. H. G. Young, second vice-president and general manager of the Delaware & Hudson Company, having resigned, the duties of such office will be performed, until further notice, by Mr. Abel I. Culver, third vice-president, with headquarters at Albany, N. Y.

OBITUARY.

A. C. Cass, first vice-president and traffic manager of the Colorado Fuel and Iron Company, died at the summer home of John C. Osgood, at Redstone, Cal., on July 4, at the age of 53. Mr. Cass was born in Wisconsin, and had resided in Denver for 16 years, where he was instrumental in the organization of the company. His death was due to a general breakdown of the system from overwork.

George Shattuck Morison, a member of the Isthmian Canal Commission, and one of the foremost civil engineers in America, died in New York, July 1, from a complication of diseases.

He was born at New Bedford, Mass., on December 19, 1842, and was graduated from Harvard in 1863. His first engagement as an engineer was at Kansas City, where he was from 1867 to 1871. He then passed two years in Michigan and Indiana, coming to New York in 1873. Here he remained from that time on, constantly advancing in his profession, and acquiring a national fame. From 1876 to 1898 he lived in Chicago, but New York was his professional headquarters. Besides the reputation which he gained as a bridge engineer, from the five bridges across the Mississippi, ten across the Missouri, and many others whose construction he supervised. Mr. Morison was known as an expert in the conditions, relations and earning capacity of the railroad systems of the country, in the locating of railroad lines, and the designing of yards and terminals. Probably his greatest work as a bridge engineer was the bridge over the Mississippi at Memphis, Tenn., which has a single truss span of 790 ft., being surpassed by only two other bridges of the sort in the world, the Forth bridge in Scotland and the Landsdowne bridge at Sukkur, India. His services as a member of the Isthmian Canal Commission, to which he was appointed by President McKinley in 1898, were of great value and importance.

From April, 1873, to November, 1875, he was the principal assistant engineer for the Erie Railroad, and during that time rebuilt the celebrated viaduct over the Genesee River at Portage, N. Y. From 1875 to 1885 Mr. Morison was associated with the house of S. C. & G. C. Ward, American agents for Baring Brothers & Co., of London, and in their interest served as director of the St. Louis, Iron Mountain & Southern Railroad; the Eastern Railroad of Massachusetts; the Maine Central Railroad, and the Ohio & Mississippi Railway. He was a member of the bridge construction firm of Morison, Fields & Co. from 1875 to 1880.

In 1887 Mr. Morison removed to Chicago, and was for two years in partnership with Elmer L. Corthell. During this time he made a trip around the world. In 1894 President Cleveland appointed him a member of the board of engineers to report on the greatest practicable length of span on the proposed Hudson River bridge in this city. In 1895 he served on the board of consulting engineers apointed to report on New York Dock Department matters. President Cleveland also appointed him, in 1896, as one of the members of a board for locating a deep-water harbor in Southern California. His appointment to the Isthmian Canal Commission followed these honors, in 1898.

Mr. Morison was a member of several engineering and scientific organizations, including the American Society of Civil Engineers, serving as its President in 1895; the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the Western Society of Engineers (of Chicago), the Institute of Civil Engineers (of London), the Mexican Society of Engineers and Architects. He was also an associate fellow of the American Academy of Arts and Sciences, and a fellow of the American Academy for the Advancement of Science. Mr. Morison resumed his residence in New York in 1898. His home has been practically at the University Club, of which he was a member, as well as of the Union, Engineers' and Downtown clubs, the Union Club, of Boston, and the Chicago Club, of Chicago.

Mr. Morison's leading characteristic was the thoroughness of his work. He understood every detail of

a bridge, for instance, and was always able to check and control all the work of his assistants when necessary.

SOCIETIES AND TECHNICAL SCHOOLS.

HARVARD UNIVERSITY.—The following promotions and appointments are announced: Prof. Charles R. Sanger, director of the chemical laboratory; Robert W. Willson, professor of astronomy; G. W. Pierce and Theodore Lyman, instructors in physics; Assistant Prof. H. A. Torrey, of the University of Vermont, instructor in chemistry; J. F. Langmaid, assistant in chemistry; W. S. Tower, assistant in physiography and meteorology.

COLUMBIA SCHOOL OF MINES.—The Summer School of the Department of Mining of Columbia University, of New York, is being held this year at Aspen, Colo., in charge of Adjunct-Professor of Mining Robert Peele and three assistants; with an attendance of 29 students. Mr. Francis T. Freeland, manager of the Durant and Smuggler mines, has kindly opened these and other associated properties to the students, as well as the concentrating and sampling works, and his hearty co-operation has done much to make the visit an especially interesting one.

INTERNATIONAL CONGRESS OF ELECTRICITY.—Dr. Elihu Thomson has been apointed president of the committee of organization of this Congress, which will meet at St. Louis in the week beginning September 12, 1904. The other members of the committee are: Vice-presidents, Prof. H. S. Carhart, C. F. Scott, Prof. W. E. Goldsborough, Dr. W. S. Stratton; general secretary, Dr. A. E. Kennelly; treasurer, W. D. Weaver; advisory committee, B. J. Arnold, B. A. Behrend, C. S. Bradley, J. J. Carty, A. H. Cowles, Prof. F. B. Crocker, Dr. L. Duncan, H. L. Doherty, Prof. R. A. Fessenden, W. J. Hammer, C. Hering, L. B. Stillwell, C. P. Mathews, R. D. Mershon, K. B. Miller, Dr. W. J. Morton, Dr. E. L. Nichols, Prof. R. B. Owens, Dr. F. A. C. Perrine, Prof. M. I. Pupin, Prof. J. W. Richards, Prof. H. J. Ryan, William Stanley, Prof. C. P. Steinmetz and A. J. Wurts.

INDUSTRIAL NOTES.

The A. Leschen & Sons Rope Company, of St. Louis, Mo., has moved its San Francisco, Cal., office to the Rialto Building, corner of New Montgomery and Mission streets.

The Chisholm-Boyd & White Company, of Chicago, manufacturers of briquetting machinery, reports that so many orders are on hand as to make it necessary to run the plant day and night.

The Broderick & Bascom Rope Company is placing on the market a new tramway, and has engaged the services of Mr. E. A. Brown, a tramway engineer with many years of experience.

The Robert Aitchison Perforated Metal Company, of Chicago, has recently received an extensive order for perforated metal from the Anaconda Copper Company, of Butte, Mont., and one car-load of metal has already gone forward. The rest of the order will soon follow.

The Westinghouse Electric and Manufacturing Company, of Pittsburg, Pa., has secured a contract from the De Beers Consolidated Diamond Mining Company, Limited, for 12 electric locomotives for use in the company's mines at Kimberly, South Africa. Power will be generated by Westinghouse turbines to operate drills, conveyers, etc., and for lighting the mines.

The Vermont Slate Company, of Granville, N. Y., says it is about to erect a cableway 835-ft. span, one end will be 160 ft. high and the other 60 ft. high, running the load down the incline. After the load is dumped with a self-dumper attachment the only power that will be required, after the load is hoisted to the cable from the quarry pit, will be to hoist the empty rubbish box or chains back again, after carrying the refuse 800 ft. away from the quarry.

An opinion was rendered Monday, June 29, by Judge Lacombe, of the Circuit Court of the United States, for the Southern District of New York, in the suit of the Chicago Pneumatic Tool Company against the Philadelphia Pneumatic Tool Company on the Moffett drill patent, No. 369,120, of August 30, 1887, denying the motion of the defendant to dissolve the injunction which was granted against it some time ago, restraining it from manufacturing, selling or using portable pneumatic drills in infringement of rights under the above patent.

The Asbestos Manufacturing Company, of Philadelphia, Pa., have completed plans for the construction of a new plant at Port Kennedy, Montgomery County, at a cost of about $250,000. The plant will be modern in design and equipment, and it is expected will be in operation by the end of the year. The company owns an extensive tract of land near Port Kennedy, from which they will quarry the dolomite rock to be used in producing carbonate of magnesium and other products manufactured therefrom, as magnesia cement and steam pipe coverings, etc. The capacity of the plant is 30,000 lbs. of magnesium carbonate daily. The officers of the company are: Michael Ehret, president; Alvin M. Ehret, vice-president and treasurer; Alonzo Gibbons, secretary; George P. Wilson, general manager, with H. S. Ehret one of the directors.

Westinghouse, Church, Kerr & Co. have recently secured orders for additional boiler and economizer equipments for the Detroit plant of the Solvay Process Company, located at Delray on the Detroit River. Steam power is furnished from a central boiler plant, which at present aggregates 7,260 h.p. Roney mechanical stokers are used throughout, and the several batteries of boiler are also equipped with Roney high-pressure circulating type, economizers. The plant is laid out in batteries of 6 boilers each. The additional equipment will consist of a new battery comprising 6 300-h.p. Babcock & Wilcox water-tube boilers fitted with Roney stokers, and four additional economizers; two of which will complete the equipment of a previously installed battery. A conspicuous feature of this plant is a massive brick stack 16 ft. in diameter and 260 ft. high.

Lately a plant for the initial treatment of rare minerals, has been completed in Denver, with a capacity of from 500 to 1,000 lbs. per diem. No custom business is done, but it is placed at the service, free of charge, of any institution of learning. Those desiring to operate the plant are invited to correspond with the owner, Mr. A. B. Frenzel, Denver, Colo. The equipment consists of electric motor, air compressor, muffle furnace, reverbatory furnace, sample grinder, Dodge crusher, leaching tank for hot or cold leach, hydraulic classifier and a concentrating table of late and improved design; also an electric precipitating vat, equipped with large porous cups and dynamo (up to 10 volts and 50 amperes). The entire plant is designed to treat ores of uranium, vanadium, tungsten, molybdenite; ores of the thorium and cerium series; all with a view to determine the lowest grades of ores which can be handled commercially.

A novel application of induction motors is to be made by the Belleville Portland Cement Company in its cement plant at Belleville, Ont., which is to be equipped throughout with Westinghouse electrical apparatus. A recent order placed with the Westinghouse Electric and Manufacturing Company comprises two 450-kw. engine-type alternators, one 100-kw. direct-current engine-type generator and a motor-generator set consisting of a 100-kw. direct-current generator and a 150-h.p. 3-phase type C induction motor. These two direct-current machines are to be used for exciting the fields of the alternating-current generators, for supplying lighting circuits and for the operation of a tramway locomotive. Sixty-two induction motors will supply the motive power, including 46 type C constant speed motors, ranging in capacity from 10 to 50 h.p.; 10 type F variable speed induction motors, each to be direct geared to a rotary kiln and provided with a controller permitting the operation of the motor at any one of four speeds; two type F motors, each to be direct connected to a hoist and provided with standard non-reversing hoist controller; also four 400-volt type C variable speed induction motors for the operation of two overhead traveling cranes, these being provided with reversible crane controllers. Included in the equipment is a Baldwin-Westinghouse mining locomotive for operation on a 24-in. gauge track with double trolley. The 10-panel switchboard consists of two generator panels, three alternating-current feeder panels, a double-exciter panel, a direct-current feeder panel for the control of the tramway circuit and another to control the circuits of the generator fields, and two direct-current feeder panels for the lighting circuits. The operation of rotary kilns by direct connection to variable speed induction motors is a new departure from the usual method of supplying power.

TRADE CATALOGUES.

A folder issued by the American Blower Company, of Detroit, Mich., briefly describes and gives prices of A B C electric fans, for ventilating, drying and heating apparatus.

The Triumph French buhr mills are for grinding iron ore, carbon, cement, plumbago and all kinds of chemicals, while the Triumph disintegrator is for reducing phosphates, salt-cake chemicals, clay, marl and similar substances.

Schumacher & Boye, of Cincinnati, O., in catalogue E, a 36-page pamphlet, describe and illustrate the engine lathes they make, ranging in size from 18 ins. by 6 ft. to 42 ins. by 30 ft. On its lathes of 36 to 42-in. swing, the company has a new arrangement for feed and screw cutting.

No. 42 of the "Record of Recent Construction" of the Baldwin Locomotive Works, of Philadelphia, Pa., is a study of the steam distribution of the Vauclain compound locomotive, being a reprint of a paper by Leonard H. Fry, read before mechanical engineering societies at Columbia and Lehigh universities.

The Northern Electrical Manufacturing Company, of Madison, Wis., in its bulletin No. 30, describes the direct current generators it manufactures. The 32-page pamphlet contains numerous cuts, showing the construction of the generators, and their appearance as connected to various types of engines, including twin generators for connection to and operation by steam turbines.

The Direct Separator Company ,of Syracuse, N. Y., in a little 16-page pamphlet, calls attention to the merits of Sweet's separators for separating steam from water or oil. The company states that over 2,700 of these separators are in use. The steam separator is claimed to deliver steam averaging 99.8 per cent dry, and the oil separator removes 99 per cent of all oil in entering steam.

Pamphlet No. 034, sent out by the C. W. Hunt Company, of West New Brighton, S. I., New York, describes Hunt industrial railways. A feature of the Hunt system is that the cars run around curves of 12-ft. radius easily. The cars have a flexible wheel-base, and the wheels have outside flanges, and oil or roller bearings as desired. The company makes its standard track in sections 20 ft. long, with curves of 12-ft. radius, the gauge being 12½ ins.

The Bignall & Keeler Manufacturing Company, of Edwardsville, Ill., issues in pamphlet form a series of circulars sent out by the company describing its pipe-threading and cutting-off machinery, including its Peerless, P. D. Q. C. and Duplex machines, which when having expanding dies are fitted with the Peerless adjusting mechanism. The company's threading and cutting-off machines range in size from hand-power machines with a capacity of ¼ to 2-in. pipe to heavy power machines for 8 to 18-in. pipe.

The Lake Erie Boiler Compound Company, of Buffalo, N. Y., in an illustrated pamphlet of 72 pages, publishes a long list of testimonial letters from coal companies, iron companies, steamship companies and many manufcturing companies, certifying to the merits of Red Star vegetable boiler compound. This compound is intended to prevent injury to boilers using feed water containing sodium chloride, lime or magnesia. The Eastern office of the company, at Broadway and Cortlandt Street, New York, is in charge of W. H. Thompson.

A pamphlet of 32 pages sent out by the Iowa Iron Company, of Dubuque, Iowa, describes the Iowa boiler, a combination tubular and water-tube, in which water-tube attachment forms an arch over the furnace, with the tubular portion above. The company states that boilers built by it have been operated successfully under 6-in. draft pressure, burning 90 lbs. of the best coal per hour per sq. ft. of grate surface, and developing 1 h.p. on less than 3 sq. ft. of heating surface. The construction of the Iowa boiler is described in detail, Among the various merits claimed are safety and durability, great economy, perfect combustion of fuel, and ease of cleaning and repairing.

A standard size, 6 by 9-in. pamphlet of 44 pages is issued by A. S. Berquist, of Brooklyn, N. Y., describing the Berquist suspension bunker, or storage bin system for storing any granular material such as coal, ore, broken stone, etc., in bulk. Claims made for this bunker, which has sloping sides and a curved bottom, are that it requires 50 per cent less material per ton of load than any other bin, that it is far more durable than wooden bins. The pamphlet contains tables for estimating the size of a bunker needed for any given plant, the diagrams for calculating the safe load on columns ,and analysis of the stability curve of the Berquist bunker. The bunkers are used by prominent engineering concerns.

Coal washing and screening plants on the Baum system are described in a pamphlet of 24 pages, published by Simon-Carves, Limited, of Manchester, Eng. In these plants the washing is done in Baum washers, similar to pulsating washers, but of much larger dimensions, the essential difference being that the pulsating motion is obtained by the action of compressed air. The advantages of the system compared with others using preliminary classification are reduced first cost, a saving in ground space, power required and in labor, a very large saving in maintenance, a minimum increase in small coal made, the prevention of loss of coal as slime, and the classification of the coal just before loading. Baum plants have been erected since 1900 at a large number of collieries in Germany and at several in England, the capacity of the plants ranging from 50 to 175 tons of coal per hour.

The Hall Steam Pump Company, of Pittsburg, Pa., sends out a 96-page pamphlet, describing the air and gas compressing machinery that it manufactures, including single, duplex and tandem and cross-compound flywheel compressors for furnishing power, for pneumatic tool, coal-cutting machinery, rock drills, air lift pumps, etc. The company's compressors are in use all over the United States, also in Canada, South America, Japan, Russia, England and China. They have air valves of the poppet type working vertically,

both suction and discharged valves being alike. The valve seats are of steel, easily renewable. The company's Class A compressors of the straight line, steam actuated type for pressures under 100 lbs., have capacities of 33 to 1,350 cu. ft. of free air per minute, while the company's Class C D duplex cross-compound compressors for pressures of 90 to 150 lbs. per sq. in., have a capacity of 60 to 1,850 cu. ft. of free air per minute. All the compressors may be had fitted with automatic governors, and an automatic unloading device.

SPECIAL CORRESPONDENCE

Denver. July 4.

(*From Our Special Correspondent.*)

The report of the assayer as to the gold and silver receipts at the Denver Mint, for the fiscal year ending June 30, gives $15,371,908 in gold and $50,212 in silver, or a total for the year of $15,422,192. As compared with the fiscal year ending June 30, 1902, there is a decrease of $141,924. This is more than accounted for by the fact that the last report closed June 17, with the receipts of the previous day, thus excluding about $600,000 gold received and paid for between that date and the end of the month, credited to the next fiscal year. Moreover, the placer season is late this year by at least three weeks, while the labor troubles at the chlorination plants at Colorado City last spring decreased the gold deposits from that source at the Denver Mint.

General Manager Frank Guiterman, of the American Smelting and Refining Company, on July 1, issued a statement declining to grant the petition of the Smeltermen's Union at the Globe and Grant smelters, near this city, for an 8-hour work day instead of a 10 and 12-hour day. The ground stated for declining to make such reduction of working hours is that the conditions under which mining and smelting are carried on in Colorado absolutely preclude the change asked for.

In this statement, Mr. Guiterman says that 75 per cent of the smelting ore of Colorado comes from the Leadville, Aspen and Creede districts. Since the beginning of 1901, there has been a falling off in this tonnage of 20 per cent; while in silver contents there has been a decrease of over 15 per cent, thus showing not only a decrease in ore production but a lowering of grade. At the same time, there has been a fall in the price of silver which has intensified the conditions, unfavorable to the miner and smelter alike. In order to meet the conditions, and to prevent further reduction in output, the American Smelting and Refining Company has reduced the smelting charge. It has been able to do this by close working, and by a better ore distribution to the different plants. The company, however, has about reached its limit. The request for an 8-hour day means increased expense in smelting ore, which the company cannot afford, and increased treatment charges to offset the greater expense. The larger charges would mean the shutting down of a great number of mines. High-grade ores are now comparatively rare, the bulk of the output being low-grade material. It is claimed that the American Smelting and Refining Company has done its best to meet conditions, and to assist the mine operators. It has done this largely in its own interest, in order to promote production, and it has been able to do it only by restricting profits and practicing the greatest possible economy.

On July 2 the committee of the union issued a statement saying that its demand had not included the rate of wages to be paid under the 8-hour system. While the union has no desire to interfere with the mining developments of the State, it claims that 12 hours a day is too long for men to work under the conditions prevailing in a smelter. The 8-hour day was absolutely required; but, as to wages, the union was willing to enter into conference with the representatives of the smelting company for the purpose of arriving at a satisfactory scale. To do this, it was proposed that the union and the Smelting Company each choose a representative, who, in turn, were to select a third; the three to arbitrate the difference as to wages, and to fix a scale to be paid for 8 hours' work.

Without waiting for any reply to this, at 11.40 on the night of July 3, a crowd of men from the Smeltermen's Union meeting, went to the Grant Smelter, and by cutting the electric light wires, thus placing the works in darkness, and by other means, induced the 200 men at work to leave the furnaces and fires. The mob then went to the Globe Smelter and stopped the 300 men there at work, also assaulting the engineer. The strike was entered upon without any warning whatever to the management of the smelters, and in direct violation of the proposal on the part of the union to arbitrate as to wages for an 8-hour day. This morning the two smelters were picketed and the men on arriving for the morning shift were turned back. Every effort is being made to save the furnaces from "freezing," failing which they may be damaged to a very serious extent. It is stated on authority that, as a result of this action of the union the Grant Smelter will be closed indefinitely, while the operation of the Globe Smelter will depend on the ability to get men.

At Colorado City the Mill and Smeltermen's Union last night declared a strike against the United States Reduction and Refining Company, on the alleged ground that Manager McNeill has not lived up to the agreement by which the strike last spring was adjusted on March 31. This in view of the fact that the advisory board appointed by Governor Peabody, after hearing evidence on both sides, reported to the Governor some weeks ago, that Manager McNeill had used all possible efforts to carry out such agreement. Present indications are that the Telluride Mill and the Portland Mill at Colorado City will also become involved.

It is said by parties claiming to be well informed that the above mentioned strikes are the first moves in a general campaign for an 8-hour day for all the unions affiliated with the Western Federation of Miners.

A dispatch from Denver, July 7, says: "Judge Dixon, of the State District Court, to-day issued an injunction asked by the American Smelting and Refining Company restricting the Smeltermen's Union, the Western Federation of Miners, the Denver Trades Assembly, the Colorado Federation of Labor and the American Labor Union from interfering with the Grant and Globe smelters of the company.

"The order enjoins them from posting pickets in the neighborhood of the plants, from intimidating employees, from publishing orders, statements, rules or directions by the officers of the defendant association, commanding under pain of personal violence or other persecution any employees of the plaintiff not to continue work or inducing persons not to enter the employment of the plaintiff."

Leadville, Colo. July 4.

(*From Our Special Correspondent.*)

A birdseye view of the work done in the Leadville District during the first half of 1903 shows a very encouraging condition of affairs. The production for the six months will amount to about 425,000 tons of all classes of ores, and an increase over the same period last year of 75,000 tons.

The most important events of the half year have been the completion of the Yak Tunnel into the Ibex No. 4 territory; the completion of the new shaft on the Moyer property in the Iron-Silver teritory opening up immense iron deposits; the finding in the 1,000-ft. level of the Diamond of the extension of the Resurrection ore shoots; the discoveries with the drill holes in the Leadville Basin of extensive iron and ore deposits in the lower contacts yet to be explored; the combination of downtown territory in order to conduct operations on a larger scale. So much for what has been accomplished. For the rest of the year exploration work along the line of recent discoveries is promised on a large scale; the announcement has just been made that the new Republic Smelting and Refining Company, which has begun the erection of a pyritic plant here, will also add two lead furnaces similar to those in its Salida plant, and will have a total capacity of 1,000 tons daily. The New Monarch Mining Company has already begun its re-timbering, and will sink its shaft from 700 to 2,000 ft., making it the deepest shaft in the camp. Several other new shafts are promised, and much new work is being laid out by several of the old producers.

In the Leadville Basin (downtown section) the recent developments have been most favorable. The Home is making a steady tonnage and has opened up with the drill ore deposits far below its present workings; the Coronado is again shipping 150 tons a day, and is being connected with the Midas by drift, thus enabling it to make an enormous production, and proving up the continuation in both the upper and lower levels of the Midas and Coronado of the immense iron shoots. The Caribou is shipping 150 tons a day, and has opened enormous iron deposits in both upper and lower levels, and will sink a new shaft in order to handle a larger tonnage. The Bon Air has recently caught two distinct lead shoots, and is following these into new territory, and also shipping rich ore. The Sixth Street has encountered a good grade iron, and is shipping 75 tons daily, and also searching for the manganese, which recently played out, but is known to be in other parts of their ground.

In the vicinity of Carbonate Hill and Graham Park very good headway has been made. The Midas is still operating on immense iron deposits, and the Wolftone, the A. Y. & Minnie, and that entire combination are being extensively developed while the two large concentrating plants of the company are operating successfully on the iron and zinc sulphides being produced. The entire combination is operated under the name of the Western Mining Company, under the direction of Messrs. Nicholson and Rodman, and is making a production of 600 tons daily. The Evelyn people are still pushing work, and the Mikado and surrounding territory are again preparing for steady activity. The big Greenback property still remains closed, owing to unsatisfactory terms of agreement between the company and smelter.

On Fryer Hill the Fryer Hill Mines Company is doing the most important work, and is making a steady tonnage of 150 tons daily, and at the same time opening up many of the old shafts of its 150 acreage, and is also fast completing its new shaft on the Pride of the West. The Progressive people are also exploring in virgin ground, while dozens of lessees are operating on various parts of the hill, and are taking out some ore.

On Iron and Rock hills there is much activity, especially in the vicinity of Iron Hill. The Moyer has been a wonder for the Iron Silver Company. Ore is opened in all directions, and has been followed from the old to the new shaft, showing continuous for 1,400 ft., while the property is making a production of 90,000 tons a month, and is in a position to increase this output. The great bodies of zinciferous material along the Minnie and about the Yak Tunnel workings are being operated through the various shafts. The Yak people have completed their tunnel into Breece Hill, where it is being tapped by Ibex shaft No. 4, and while the Yak is shipping 150 tons a day it is preparing for much development work. There are also many lessees in this locality who are operating successfully, and making ocasional shipments. The Gilt Edge people have put a plant of machinery on No. 1 shaft, and will connect at once with No. 2, where much prospecting and development is under way. Lessees are working in the upper levels of the White Cap and shipping. The Corona is making a good showing, and new exploration is under way. The Yak has now reached a stage by which it will prove of great value to the territory along its line, and much new work can be carried on, not alone by the company, but by leasers who are able to handle their work through the Yak connections.

Over in Big and Little Evans gulches and on Breece Hill, the Gold Belt section of the camp, the developments have been highly satisfactory. The Resurrection people have proven that the magnetic concentrating treatment on their ores a success, and are handling a large tonnage of low-grade sulphides that have long laid idle. The Fortune has encountered some rich ore and Mr. McNeece is preparing for extensive development work. The New Monarch people are again getting shipments under way, as they are ready to handle very soon now the sulphides through their roasters at the Salida smelter. They are also re-timbering the New Monarch shaft preparatory to sinking to a depth of 2,000 ft., following down the great sulphide deposits already opened up in all the three shafts of the company to a depth of 600 to 700 ft. The Ibex people, while shipping about 250 tons a day, have been doing a great deal of exploration work. They will sink No. 1 shaft from 800 to 1,250 ft., while No. 4 shaft is now being put down and is nearly completed, connecting with the Yak Tunnel, and thus permitting the exploration of virgin ground at a depth never before attempted. The new Valley combination and properties in that neighborhood are carrying on very important prospecting, and development work. The Diamond people, having caught the extension of the Resurrection ore in their lower levels are following the ore in for a long distance, and, while it is low-grade material, it is shipping quality, and new machinery is being installed to permit shipments of 100 tons daily. The Gold Basin Mining Company is making occasional shipments of rich material running 4 to 7 oz. gold, and has been following this same streak for over a year, but has been unable to get into any large body of this class of material. The Rawlings lease, the Black Prince lease, the Big Six lease, the Lillian lessees, and a score of others in that locality, are all working and making occasional shipments. The Ballard is developing and prospecting, and is also experimenting with the cyaniding process on its immense deposits of low-grade siliceous ores. The Penn also has enormous bodies of this material opened up, and besides has gotten into a better grade of the stuff from which shipments average 75 tons daily. Much work is also under way on smaller propositions along the gold belt, while new work is planned in several parts of that territory.

In the outlying sections a large number of prospectors are meeting with success, while some of the older properties are forging to the front. This is especially noticeable in St. Kevin, Sugar Loaf, Dewey, Homestake, Horseshoe, Alicante, Birdseye and Mosquito, so that from rim to rim there appears every indication of a long future for the carbonate camp.

San Francisco. July 1.

(*From Our Special Correspondent.*)

The Pinal gusher oil-well near the Carreaga field in Santa Barbara County, 8 ins. in diameter, has been sending its oil 50 ft. above the derrick at the rate of about 40 bbls. a minute, and as there was no provision for storing the product it ran to waste down the canyon until finally capped on June 30. After the first rush the well settled down to about 1,000 bbls. of oil per day. This is in a district where it was not thought much oil would be found, but experience is better than theory, and the owners of the well are very much satisfied with results.

Certain modifications have been made in the plans

for the construction of the first of the series of debris dams on the Yuba River above Marysville, and these changes have been approved by the Secretary of War and the California State Board of Examiners. The dams are being built at the joint expense of the Federal Government and the State of California. They are not intended to be dams behind which hydraulic miners may deposit their debris or tailings, but are intended to prevent the debris already in the river beds from coming further down to the navigable portions of said rivers. Every hydraulic mine above the dam must still impound its individual debris, under control of the California Debris Commission. But long before there was any anti-debris law, when anybody could dump his tailings into the smaller streams and mountain rivers, large quantities of tailings were so dumped. They continue to come down from the upper mountains a mile or so a year, and finally deposit in navigable waters. These new and expensive dams are intended to check this flow, and to restrain the debris from its gradual advance. At first the miners thought the construction of these Government dams would permit them to hydraulic, without building dams for each mine, but the law is not so construed, and each mine must build its own dam.

However, the construction of these public dams, which are to cost over half a million dollars, and are but preliminary to others to be built, will do away with much complaint from those residing on the lower rivers, where navigation is apt to be impeded by the onflow of debris deposited 40 or 50 years ago by miners. The torrential streams of the winter months gradually convey this debris lower and lower down the rivers, until it finally gets to those points where navigable streams are filled in. The dams are expected to remedy this.

The southern end of the big pipe line of the Standard Oil Company, which is to bring oil from the Kern County fields to Point Richmond on San Francisco Bay, is giving no trouble. The warm weather of the summer months has relieved them from trouble at the pumping stations. Below Mendota, in Fresno County, everything is all right. Above there the oil does not flow as rapidly as had been hoped. However, the oil company expects before long to see the oil flow from the pipe at the refinery at Richmond.

The two mining exchanges of Los Angeles have finally made a merger and come together under the name of the Los Angeles Stock Exchange, indicating that all classes of securities will be called. While the agreement has not been ratified at this writing it is understood that the membership will be limited to 100 persons. The governing boards of both bodies have indorsed the plan of amalgamation, which is shortly to be ratified by all interested.

The people up in Shasta County are pleased that a third large smelting plant is to be built in that section. This time it is the Balaklala Mining Company, which is to erect a plant. The Mountain Copper Company and the Bully Hill Copper Company, already have extensive plants for the reduction of copper ores.

There is no sign as yet of any improvement in the strike conditions at Randsburg, Kern County, where many mines have been closed down, including the larger ones employing many hundreds of men. The Yellow Aster people declare they will continue closed down indefinitely until the miners listen to reason. Meantime, the miners have taken up prospecting in that region, both in the mountains and desert, an occupation not at all desirable during the exceedingly hot summer months.

The Commissioner of the General Land Office has withdrawn from entry 272,000 acres of land in Susanville land district in Northern California, which is to be included in the Warner Mountain forest reserve.

Mr. Harold T. Power, of Michigan Bluff, Placer County, has been appointed by the Governor one of the trustees of the State Mining Bureau, in place of Frank Drumm, resigned. Mr. Power is one of the younger of, the prominent practical mining men of the State. He is president and principal owner of the Hidden Treasure Drift Mining Company, of Michigan Bluff, Placer County, and manager of the Morning Star drift mine on the Iowa Hill divide, Placer County. Both are producing mines, and the Hidden Treasure is perhaps the most extensive drift mine in this country.

Up in the eastern part of Butte County this season there is quite a boom in pocket mining. Some hundreds of men go into this business in the summer months, as they do around Downieville, Sierra County, and in a few other portions of the State. This pocket hunting is a branch of mining only to be learned by experience. Some men follow it all their lives, and are poor, or rich, according to their luck and skill.

It is expected that this week will see the final arrangements made by which the California powder companies became absorbed by the Du Pont Company, of Delaware. The Judson and Vigorit companies have concluded the arrangement and the California Powder Company is already controlled by the Du Ponts. The Giant Powder Company transfer has not been perfected at this writing, but it is expected to be in a few days. The project has naturally increased the prices of powder stocks in the local market.

The *Bulletin* on the Quicksilver Resources of California to be issued by the State Mining Bureau has been completed and sent to the printer, so will doubtless be ready for distribution in about a month. Mr. William Forstner, field assistant of Lewis E. Aubury, State mineralogist, has been engaged for many months collecting the data for this important *Bulletin*. It includes chapters on general geology, ore deposits, statistics, metallurgy, etc., and detailed descriptions of every quicksilver mine in the State, large and small. The *Bulletin* will be very fully illustrated. It deals with quicksilver in California only, slight reference being made to occurrences in other regions, but as California, with the exception of a small amount from Texas, produces all the mercury in this country, it is practically a description of the quicksilver resources of the United States.

In addition to the big power plants on the Feather River, mentioned recently in this letter, the Golden State Power Company is to construct several more. Four plants are to be installed, the first to furnish 90,000 h.p.; the second, 45,000; the third, 55,000; and a fourth, 20,000; total, 210,000 h.p. The plant above Big Bend will have a very extensive dam across the deep and narrow canyon of the North Fork. The walls of the canyon are of solid rock, and very steep. The top of the proposed dam, 160 ft. high, will be only 220 ft. long. The base will extend up the river 650 ft. The rock for the dam is to be quarried in the canyon. There will be a spillway 100 ft. wide and 10 ft. deep on each side of the dam, either of which is to carry the ordinary flow of the river. By means of a canal 5 miles long, the water will be delivered at the power plant under 350-ft. head. The dam will back the water up the narrow canyon about 7,000 ft.

Victoria, B. C. June 30.

(*From Our Special Correspondent.*)

Notwithstanding the fact that the output from the East Kootenay collieries last month constituted a record achievement, amounting in the aggregate to 57,720 tons, the Kootenay smelters still complain of inadequate fuel supply. At the Trail smelter all the hand roasters were closed down last week on this account, and operations in Boundary have also been restricted. This month, however, it is expected that the Crow's Nest Company's output will reach 75,000 tons; but it is also stated that the demands of the Canadian Pacific Railway are becoming greater, and that that company now consumes 15,000 tons monthly.

Reports from the Ymir District are good. At the beginning of the month, the Arlington, at Erie, resumed shipments, and several car-loads of ore have been sent out averaging $50 per ton. The lessee, Mr. Muffett, has already marketed some $20,000 worth of ore, and this from a mine supposed to be worked out. The Ymir (Atlin) Gold Mining Company is also shipping $30 ore to the Mall Mines smelter, and several other properties in the vicinity are yielding fair returns, while a recently organized local company is preparing to develop the Pilot and Exchange claims, on which a stamp mill is to be set up.

The mines in the granite belt near Greenwood are coming very rapidly into prominence. Thus in the Providence the lead has been cut at the 180-ft. level, the vein being from 12 to 15 ins. in width, and the ore of a similar character to that encountered at a depth of 125 ft., some of which yielded $150 and upwards. A rich strike was also reported to have been made last week on the Elkhorn. Rich ore is being sacked at the Lancaster Fraction. Operations at the Goldfinch have been resumed, and the developments at the Defiance are being continued with satisfactory results.

In Rossland there is now much increased activity. The Giant has joined the list of shipping mines, and the Jumbo is making arrangements to commence production at an early date. Operations at the Northport smelter, which have been restricted by the inadequacy of the coke supply, are now in full driving, the deficiency in respect to coke having been made good. At the Le Roi No. 2 the installation of the oil concentrating plant is proceeding rapidly, and it is expected the mill will be completed and in readiness to commence operations by the 1st of October. It is stated that the Le Roi No. 2 has now about 20,000 tons of milling ore on the dumps at the Josie and No. 1 mines. Further, considerable quantities of ore are being added to the dumps weekly, and the tonnage in reserve will be considerably in excess of present figures by the time the mill is in operation.

The Crow's Nest Coal Company proposes to shortly open three mines at Fernie in addition to those already being worked. Production is now maintained at the rate of about 1,100 tons daily, 114 coke ovens being in operation. At Michael, 212 ovens are operated, and stone bases are laid for 250 additional ovens, the building of which should be completed early in September. At Morrissey three seams and two prospects are being opened, with an average output of 900 tons daily. The new coke ovens, numbering 250, are now nearing completion.

It is proposed to set up a third furnace at the Montreal & Boston Company's smelter at Boundary Falls. The furnace has been completed for some time, but owing to there being insufficient coke coming in its start has been delayed. However, the outlook seems to be promising for an increased fuel supply, so preparations are to be made forthwith to complete the work. The additional blower ordered for this smelter has been shipped by the manufacturers.

Mining in the Atlin District has received a somewhat severe setback as a result of recent floods, caused by the too sudden advent of warm weather. Operations on nearly all the creeks have been interfered with, some to a serious degree. On Boulder Creek in particular the damage was very great, while on Spruce Creek wing-dams and head-dams were carried away, and machinery buried beneath accumulate debris. An important transfer is meanwhile reported to have been just made in the district, the Columbia Gold Mining Company having acquired a working bond on a valuable Pine Creek property, comprising some 200 acres and including a water concession of 2,000 miners' inches. The property is to be thoroughly exploited at once.

Hydraulic mining, both in the Big Bend District and on Perry Creek in East Kootenay, is being carried on more extensively this year. From McCullough Creek, in the former district, some coarse gold has been taken during the progress of development work, and promising prospects have been opened upon French and Smith creeks. On Perry Creek operations are being carried on by means of a steam shovel.

This week the transfer of a three-tenths interest in the Britannia Mine at Howe Sound was completed, the consideration being $164,000.

London. June 27.

(*From Our Special Correspondent.*)

A flotation of considerable importance is about to take place in London, in the shape of the introduction of the well-known Great Cobar Copper Mine in New South Wales. The Great Cobar has been producing copper for nearly 30 years. From 1876 until 1889 the total output was 213,182 tons of ore, yielding 11 per cent of copper; after which working was suspended for a few years. Operations were recommenced in 1894, and since then to the end of last year 730,669 tons have been raised, averaging 3.27 per cent of copper. The owners are now selling to an English company, and Mr. J. D. Kendall, who has examined it on their behalf, estimates that there is over 1,250,000 tons blocked out, averaging 3.79 per cent of copper, and another half million tons which the average mining engineer could conscientiously believe to be present. The ore also contains gold and silver to the extent of about $2 per ton, which will increase the value of the copper bullion by about £10 per ton. Mr. Kendall sees no sign of exhaustion of the ore and considers that the mine has considerable speculative value as regards future developments. The history of the mine throws light on the apparent falling off in copper contents. At first the conditions under which work was carried on prohibited the mining of anything but the richest ores, and operations were confined to a well-defined zone of secondary enrichment. The nearest railway station was nearly 300 miles away; besides which the water supply was poor. The first mentioned drawback was removed in 1892, when the railroad was pushed through to Cobar, but the water question presents some difficulty still. There are, on the other hand, several important advantages that the new company will enjoy. The most important is the possession of two excellent coal mines at Lithgow and Rix Creek, which yield good coking coal. Another advantage is that in addition to the smelting plant, the company will own an electrolytic refinery at Lithgow. The property to be acquired also includes the Nymagee copper mine, and the Peak and Conqueror gold mines. The Nymagee is known as a producer of copper, but not on such a large scale as the Great Cobar. The Peak and Conqueror gold mines are equipped with stamps, but it is probable that eventually their ore will be used as a flux for the copper ores. The ore is siliceous and carries practically no iron and sulphur, so that it would be suitable as a flux for such basic ores as those of Cobar and Nymagee. The whole proposition looks to me to be a businesslike one, and, with the expenditure of a considerable amount of capital on developments, the output could be made both large and profitable. The new company is to be called the Great Cobar, Limited, and the capital is to be £650,000 in ordinary shares; £650,000 in 8 per cent cumulative preference shares, and £700,000 in 6 per cent debenture stock. The purchase price is £1,475,000, of which £1,175,000 is payable in cash and £300,000 in shares, whether ordinary or preference, or both, is not yet fixed. Of this purchase price the sum of £1,150,000 in cash goes to the Australian owners, and the shares and the remainder of the cash to the English syndicate that is floating the company. It is certainly a big price to pay, but the Australian owners will not take less, or take payment in anything but cash. The people in whose hands the flotation is are well known as competent administrators of mining companies. It is only necessary to

mention that Mr. Nicol Brown is the leading spirit to commend the investment to business men.

The flotation of the Great Cobar, Limited, is interesting from the point of view of mining company finance that I have called attention to several times, for, in the arrangement of the capital, large provision is made for its reduction from year to year. The share capital is £1,300,000, and the debenture capital £700,000. A sum of £100,000 is to be set aside every year out of revenue for the reduction of the debentures. Primarily, of course, the arrangement of debentures, preference and ordinary shares is made for the purpose of meeting the requirements of the various classes of investors and speculators; but it is also the practical expression of opinion that a substantial amount of capital should be repaid out of profits to provide for the depreciation of the property.

Some weeks ago Mr. Skewes referred at length in your columns to the electrical ore finder devised by Messrs. Daft & Williams. The finder has been tried experimentally in many parts of the British Isles, but hitherto it has not been seen abroad. It is now decided that Mr. Ernest Lidgey is to try the system in West Australia, chiefly in searching for lost and faulted veins. Mr. Lidgey has made a special study of tracing lost leads and veins, and in his hands the apparatus should have an excellent opportunity of showing such advantages as it may possess. This application of the apparatus should have an excellent opportunity of showing such advantages as it may possess. This application of the apparatus should be more favorable as a test of its capabilities than searching for veins haphazard, for it is much easier on general principles to search when one knows what it is one is searching for.

San Luis Potosi, Mex. July 1.

(*From Our Special Correspondent.*)

The heavy rains have ceased, at least for a time, and traffic again proceeds uninterruptedly. New mining deals, work and improvements seem to be unceasing. But of great import to the Republic of Mexico was the turning out, on June 20, by the Monterey Iron and Steel Company of its first steel I-beam, made entirely from Mexican product—coal, coke, ores and fluxes.

In Sonora, the Nogales Copper Company, among other improvements which it is starting at its properties near Magdalena, will erect a 100-stamp mill, and a concentrator and 40-ton smelting plant are being erected at La Blanca mines, near Suaqui Grande. The Santa Cruz Copper Company is the name of a new company organized to work a rich group at Santa Cruz. The Gutierrez Mining Company, working the Gutierrez Mine at La Baranca, has taken under lease and bond from the Flores Brothers, for $75,000, gold, the Belene mines, of La Barranca, and from other people, the Nahuila group at San Javier, for $65,000, gold, and development work will at once be started at both places. An American company has acquired from the Lopez Brothers, of Hermosillo, some large gold porperties, near Acouchi, Sonora, for $100,000, gold, and the Carmen and Esmeralda, both of Arizpe, have also been bought by an American company, at $40,000 and $100,000, gold, respectively. Near Bocoachi, William Lane is said to have made a rich gold strike. And over in the State of Sinaloa, near Leones, in the Bamoa District, some gold strikes are reported.

In Chihuahua, Messrs. Whalen and Lines have made a rich strike in the Dos Cabezas Mine, which they hold under lease and bond for $40,000 Mexican. La Raya and Cigarrero, of San Almaloya, about 25 miles from Parral, are in bonanza, and the strong iron and manganese croppings, on which they are located, are attracting many prospectors from Parral; and in the Presena Mine, of the Hidalgo Mining Company, at Minas Nuevas, another rich strike is reported.

On the Palmillo Mine, near Parral, a large power plant is now being erected by the present owner, Pedro Alvarado, and another is under construction on the properties of the Consolidated Mining Company, of Parral. Leases and bonds have been taken by J. C. Brooks on the San Diego Mine at Santa Barbara, by the Saginaw Mining and Milling Company on the Quatro de Julio, of Messrs. Baskin and Thomas, Parral; by the Stillwell people (or the Kansas City, Mexico & Orient Railroad) on the Germania, which has 45 pertinencias adjoining the Refugio Mine of Parral; and on all of these work will be started without delay.

In Sonora the Lucky Tiger Company has taken the initiative in a possible method of settling the Yaqui Indian question by inducing the Yaquis to work in the mines. The Yaqui Copper Company is preparing to erect a power plant of 1,000 h.p. on the Yaqui River for the transmission of power to Campo Santo Nino. In the Arizpe District, on Cerro del Basaltequi, the Eva has been sold by Howard and Lightfoot to R. K. Clancy, who has bought a number of other properties in the district. In the Sahuaripe District, the new camp of Cieneguitas is experiencing a boom.

Though the volume of business continues remarkably small, exchange on New York went up last week to 245, but dropped back on Saturday to 242.

Johannesburg, Transvaal.

(*From Our Special Correspondent.*)

A distinct improvement is noticeable on the Rand in the attention given to the well-being of miners, both white and black. In the workings of some mines this question has been grossly neglected, no attempt being made to remove the excreta of the men; but merely from an economic point of view it is seen that it pays to look after the sanitation of a mine, and the present sanitation of the underground workings is all that could be desired.

Some "dead end" on each level is partitioned off, and here several large iron buckets are placed. It is possible in a big mine to carry out this work with 2½ Kaffirs, two blacks giving all their time to it, while one puts in only half his time at the work. Disinfectants are fully employed. Once a day the buckets are collected and carried to the surface. At some mines the excreta is carried direct to the plot of ground set aside for agriculture, where it is dumped and immediately ploughed under.

Just now this question of sanitation is a very live one in Johannesburg. The present method of dealing with the excreta of this large community is very crude. Buckets are placed all over the city, and about midnight carts collect these buckets, and carry the excrement to the dumping ground, some 8 miles from the city. An up-to-date sewerage scheme is therefore one of the improvements of the near future. If this scheme is to embrace all the mines in the municipal limits, no doubt the mines will adopt the Liernur sewerage method. In which all the excreta is carried by water and pumps to a central station, where it can be treated or emptied into a main sewer.

An experiment of dealing with excreta from the mine by the "Pneuma Destroyer," which burns the material, was tried for some time on one of the properties, but ended in failure.

Not a pound of the sewerage of Johannesburg should be wasted because of the amount of arable land which would be benefited by the scientific utilization of this refuse. In establishing a sewerage system the best expert advice will be obtained. It looks as if Johannesburg were following the example of Glasgow in owning its tramways, lighting plants, etc.

Perth, W. A. May 25,

(*From Our Special Correspondent.*)

Kalgoorlie.—The following are the principal returns included in the April gold-field: Golden Horseshoe, 17,525 oz.; Boulder Perseverance, 17,520 oz.; Great Boulder, 14,097 oz.; Ivanhoe, 10,863 oz.; Brownhill Extended, 9,294½ oz.; Associated Northern, 8,225 oz.; Oroya-Brown Hill, 8,038 oz.; Associated Mines, 6,005 oz. These, with smaller outputs, brought the total returns for April up to about 109,000 oz.

The Golden Horseshoe continues to develop well, and the shoots apear to be increasing in size, while the ore maintains a consistent value to the deepest point yet reached. It is anticipated the improving conditions will soon decrease costs appreciably. The Boulder Perseverance could very easily increase the output considerably. The main shaft will soon reach 1,100 ft. The ore-bodies at the ninth level are about 15 ft. wide, and pear-shaped. The latest estimated value of ore reserves in sight is equal to about 500,000 oz. gold. The Great Boulder announces a bonus of 6d. per share in addition to the usual quarterly dividend. The management is considering a scheme for comprehensive development in the deep ground on the northern blocks. It is probable this scheme will include sinking a new shaft to open up the southerly extension of the Ivanhoe's east lode, recently cut at 1,300 ft. in Great Boulder ground. Development has been suspended at the 1,600-ft. level in the main workings pending the diamond drilling westward into Ivanhoe ground.

At the Kalgurlie Mine driving on the course of the lode will shortly be resumed. The ore here is worth over 1 oz. per ton. The mine is looking very well in all the workings. At the 440-ft. level ore is being stoped from the north end for a width of 60 ft.

The April output was 3,770 oz. Some surprise has been occasioned by the sudden closing of the South Kalgurli Mine, by orders from London. This will, of course, be only temporary, pending the raising of fresh capital. With the ore in sight, and the monthly return of over £2,000, it is thought that the company could have arranged its affairs without stopping.

The Hainault Mine has much improved. Some good gold-bearing oxidized ore is being taken from a good width of the lode in No. 9 shaft, and good average grade ore is being opened up in other workings.

The Oroya-Brownhill Mine has struck tellurides at 50 ft. below the ninth level in a cross-cut from the bottom of a winze. The ore forms part of the famous shoot which has been followed south across the Oroya north block to about 20 ft. south of Pomeray's (main) shaft.

Nullagive.—This camp, where the principal property is owned by the British Exploration Company, of Australasia, Limited, is watched closely, owing to its having several foundations almost identical with the famous bankets of South Africa, and estimated to be worth about 10 dwts. per ton.

Iredin River Coal-field.—A seam 6 fit. 2 ins. thick has been cut by the diamond drill, at a depth of 905 ft. The seam is hard and strong. The Government geologist's analysis of the sample is: Specific gravity, 1.410; califoric value, British thermal units, 11.959; approximate composition: moisture, 2.66; volatile hydro-carbons, 29.68; fixed carbons, 52.92; ash, 14.74.

The Greater Pass is a clean, hard, bright bituminous coking coal, yielding a dense, hard coke of good quality. The percentage of moisture is about the same as New Castle coal. The calorific value is much higher than that of Collie coal, and the fuel appears to be well suited for all ordinary purposes.

GENERAL MINING NEWS.

ALASKA.

(*From Our Special Correspondent.*)

Word comes from the north that hundreds of miners who went to the new diggings at Tanana, Alaska, from other Yukon camps are coming out of there disgusted. Winter development was impossible without machinery, and about 2,000 men are now getting away from there to find work elsewhere. The new camp needs capital and machinery before it can be a success.

ARIZONA.

GILA COUNTY.

(*From Our Special Correspondent.*)

Mallory.—This mine, near Globe, has 30 men at work at the bottom of the 400-ft. shaft.

GRAHAM COUNTY.

(*From Our Special Correspondent.*)

Sierra de Oro Gold Mining and Milling Company, Limited.—This recently organized company, owning gold-bearing quartz lodes on the borders of the San Francisco River above Clifton, has been financed by Illinois men, and work has been resumed on the lower drift tunnel. This follows the vein and is yielding good free-milling ore with pyrites. A mill will soon be erected at the river, where there is an unfailing supply of good water.

MOHAVE COUNTY.

(*From Our Special Correspondent.*)

Cyclopic.—This mine, at Gold Basin, has closed down on account of the company refusing to give 10 hours' pay for eight hours' work. A majority of the men who stopped work found employment at the Senator Mine in the same camp.

Elkhart.—The working force of this mine at Chloride, has been increased to 25.

Mott.—This mine, in Aubrey District, will soon have a 2-stamp mill treating its gold ore.

Virginia.—This mine, in Weaner District, 25 miles west of Chloride, has a new 10-stamp gold mill using water from the underground workings. The vein material is calcite.

CALIFORNIA.

AMADOR COUNTY.

Del Monte.—For the new mill at this mine, near Coloma, the lumber is now being hauled in.

Eagle.—The winze, 400 ft. in on the main tunnel in this mine, at Grizzly Flat, is in an 8-ft. ledge of good ore.

Eureka & Woodside.—These mines, near Georgetown, have been bought by the El Dorado Gold and Copper Mining Company, which has also purchased the Modoc, Van and Bilger quartz mines adjoining. This company, which owns the Ford copper mine, will put up at once a steam hoist and sink a 1,000-ft. shaft to develop the Eureka and Woodside claims.

Mount Pleasant.—This mine, at Grizzly Flat, has been unwatered to the 500 level and development work has been resumed on that level.

KERN COUNTY.

Amalie District.—This district is to be reorganized, to embrace all the territory between a line 3 miles south of Indian Creek at its intersection with Stevenson's Canyon, and a line 9 miles north of Indian Creek. The district to extend about 6 miles in each direction, east and west, from the intersection of Indian Creek and Stevenson's Canyon.

Morton Mining Company.—This company, at Randsburg, has closed down its property, owing to the miners' strike. The Mattie has also closed down.

MADERA COUNTY.

Jessie Bell.—The main shaft is 95 ft. deep, and the ore is reported 8 ft. wide. A spur track has been built from the Southern Pacific line, and arrangements are being made for shipping ore.

Knickerbocker.—This old copper mine, near the Jessie Belle, idle for many years, has been bought by Los Angeles men, who are unwatering it preparatory to development work. Charles Nelson is superintendent.

MENDOCINO COUNTY.

Russian River Oil Company.—This company, of which James Stitt is president, has let a contract for

an oil well on Gibson Creek, where oil was found 20 years ago.

Ukiah Oil and Development Company.—This company, operating near Ukiah, is boring a new well a short distance south of the old one.

MONO COUNTY.

The Bridgeport *Chronicle* reports that a mill is to be built at once at the Sturgeon ranch to treat ores from the neighboring mines.

NEVADA COUNTY.

California Mining Company.—At this property, at Gaston (formerly the Gaston Ridge Mine), about 50 miners are at work.

Copper.—At this old copper mine, at Spenceville, a cave occurred, which destroyed the hoisting works, etc. The mine has been some time idle.

Ethel.—At this mine, Gaston, E. C. Grissel and J. Olson are doing development work with five men.

Grass Valley Consolidated and Sunders.—These mines, at Grass Valley, have been sold to J. M. O'Brien, of San Francisco. The Grass Valley Consolidated was formerly the Green Mountain Mine. The Consolidated is fully equipped with an electric power plant, mill, etc.

Hussey Brothers.—From this mine, in Willow Valley District (Nevada City P. O.), rock is being hauled to the Nevada County mill to be crushed.

Oustomah.—The new mill at this mine, Frank Morgan superintendent, has been started up.

Sierra Queen.—Mr. W. H. Martin, for a long time past superintendent of this mine at Nevada City, has resigned, and Mr. D. D. Miller has been appointed in his place.

Sterling.—Rock from this mine is being hauled to the Nevada County mill to be treated. After sorting, the richest will be shipped to the smelting works. J. E. Magovern is superintendent.

Zeibright.—The owners of this mine at Nevada City, Fred Zeitler superintendent, will incorporate and raise capital for development.

PLACER COUNTY.

Eureka and June Bug.—These mines, at Ophir, the former owned by George B. Knoff, are to be started again.

Hanley.—This mine, near Penryn, owned by J. M. Manley, is to be pumped out and worked.

PLUMAS COUNTY.

Centennial.—The Five Bear Company has purchased this mine and mill, near Genesee. Water power is brought in.

Colonial Group.—It is the plan of the company owning this property, near Quincy, to build a mill of 100 tons daily capacity.

Feather River Mining Company.—This company has located 5,000 miners' inches of water on Shoofly, a branch of Indian Creek, and will construct a flume and power plant.

Round Valley Consolidated.—This group of mines, near Greenville, comprises five claims, known as the Antelope, Arcadian, Sunset, Sunrise and Hong Kong. The mine and a ten-stamp mill have been purchased by Eastern men, who intend erecting a 40-ton cyanide plant.

SAN BERNARDINO COUNTY.

A Ludlow prospector has found at Amboy, near Bagdad, a heavy ledge carrying gold, silver and some copper. The ledge is reported to be 14 ft. wide. Few prospectors will go to that region at this season, as the great heat prevents much work in that part of the desert. Los Angeles men will develop the vein later in the year.

SAN DIEGO COUNTY.

It is reported that bismuth has been found in the lepidolite mines, near Pala.

Stonewall.—At this mine, at Guyamaca, Manager Lucas says it is the intention to sink the shaft to 1,000 ft., or 400 ft. deeper, as soon as the water is removed. It is expected to cost $25,000 to unwater the property.

SHASTA COUNTY.

Balaklala.—C. A. Malm, of San Francisco, controlling owner of this copper mine, near Kennet, announces that the company has contracted with an Eastern firm for an extensive smelting plant for the mine.

Midas.—At this mine, Harrison Gulch (Knob P. O.), about 400 men were paid off on last pay-day. The camp is in a flourishing condition.

SISKIYOU COUNTY.

The Parks place on Lane Street, in the town of Yreka, has been bonded by Hadley & Co., who have placed a steam pump on the property for drainage, while sinking a shaft to bedrock. The ground is expected to prove rich at bedrock, as did other claims in that vicinity when mined in the 50's. It is thought that all the ground in the Yreka town site would pay well, but it is held by individual owners, and could scarcely be worked as a whole.

Greenhorn Blue Gravel.—This mine, near Yreka, has been shut down again. Scarcity and expense of wood has been the main cause of the stoppage. There is still 12 ft. of water in the shaft. The mine was being unwatered with a view to new development.

Headquarters.—At this quartz mine of J. E. McBride & Co., on Humbug, the wagon road has been completed and Hegler Brothers have begun running the tunnel.

TRINITY COUNTY.

Quimby Creek.—Messrs. Cronin & Co., who had commenced work on this mine at New River, have stopped operations. They decided that the mine was not extensive enough to warrant the great expenditure necessary to build 30 miles of wagon road in that rough mountain region, and to put up a mill. Beale & Temple, former owners, will doubtless again assume control and develop the claim on a limited scale.

TULARE COUNTY.

Little Meadow.—The new mining district at this place, on the banks of Kern River, recently discovered by Sylvester, Schaffer, Elwood and Bennett, has created much interest in that vicinity. The ledge discovered is wide and carries good values. A number of men have gone to the new district, which will be thoroughly prospected.

TUOLUMNE COUNTY.

Mohican.—At this mine, Carters F. Chappelet superintendent, lumber is being hauled for improvements, consisting of an addition to the mill and a new hoist.

Santa Ysabel Mining Company.—This mine, at Stent, was formerly known as the Miller & Holmes, and then as the Knox & Boyle. A Boston company, with Wilson A. Belcher, of 40 State Street, Boston, as president, and E. C. Loftus, of Stent, as manager, has taken hold of the mine, and also the Bastian property, to the east. Just before the mine was closed down three years ago an electric power plant was put in, four electric hoists installed and a big gallows frame erected. Twenty stamps were added to the mill, but never used. The shafts were all small and Mr. Loftus has started a new three-compartment one and moved the hoist to it. The new shaft is now down 150 ft. Boilers and engines fit to sink 3,000 ft. have been purchased. Compressed air will be used when there is water power and steam at other times. Thirty men are now employed at the mine, and the whole property is being put in shape for effective work upon it.

YUBA COUNTY.

Sacramento men have secured a large tract of land near Marysville for dredging purposes. R. C. Cranston, of the Sailor Bar Mining Company, will be in charge of the work.

COLORADO.

At a meeting of the board of directors of the Colorado Fuel and Iron Company, held in New York City on June 24, John C. Osgood, John L. Jerome and A. C. Cass, of Denver, resigned from the directorate. John D. Rockefeller, Jr., F. T. Gates and E. Parmalee Prentice were elected to fill the vacancies. The present board of directors is: George P. Butler, John D. Rockefeller, Jr., E. Parmalee Prentice, F. T. Gates, George J. Gould, Benjamin Nicoll, James H. Hyde, E. H. Harriman, Edison Hawley, H. E. Huntington, Frank Trumbull, J. H. Kebler and J. H. McClement. J. H. McClement was elected chairman, vice John C. Osgood resigned, while F. T. Gates and John D. Rockefeller were elected to fill the vacancies on the executive committee.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

A 30-ton Tetrault concentrating plant is to be erected at the junction of Elk and Pine creeks by Clarence S. Palmer, of Kansas City, and L. J. Mountz, of Apex, the latter to be in charge. It will run on ores from the Sarah Jane and Mackey properties. The mill building will be 30 by 60 ft., and a 40 or 50-h.p. engine and boiler will be installed. Various tests have been made on the ores from the properties.

Machinery is being received for the new plant on North Clear Creek at Black Hawk, the engine and boiler has been set, and the contractor has begun work on the new buildings. Eastern and Colorado men are interested, and expect to have the new plant running by August 1. B. G. Granville, Central City, is in charge.

Electric Spark Gold Mining Company.—Omaha, Neb., men have taken a lease and bond on the Shamrock Mine in lower Russell District. A new building and machinery are on the main shaft, and the latter is being retimbered to bottom, 350 ft. This work will be completed by August 1. J. C. Martin, Black Hawk, is manager.

LAKE COUNTY.

The city of Leadville does not own the mineral under its streets and alleys, according to the decision of Judge Bailey. of Canon City, who tried this important case a few months ago and rendered his decision June 27.

The case in point was that of the Coronado Mining Company and others against the city and involved valuable mineral rights. The case was first tried in the district court before Judge Rucker, who decided it in favor of the city. The company appealed to the Supreme Court, which reversed the decision and remanded the case for retrial, for the reason that certain evidence had not been allowed to be introduced. This trial occurred about four months ago, when Judge Bailey presided. Whether the case will now be returned to the Supreme Court on an appeal has not been decided.

The most important point in Judge Bailey's decision is to the effect that the deeding of the streets and alleys to the city was simply for carriage and public purposes and had nothing to do relative to the mineral rights.

(*From Our Special Correspondent.*)

Fanny Rawlings.—The only work of importance on this gold belt property is on the Lanphier lease. Some ore is shipped from a vein showing good gold values at 120 ft.

Homestake.—A road has been opened through the snow, and Manager George Campion is preparing to operate this property. A great deal of work was done formerly on this old-time property.

Kentucky Belle.—This Buckskin Gulch property has been purchased by Denver men. A large fissure vein is opened, showing good values in the rare metals.

Little Alice.—Permission has just been given to the owners of the Houston claim adjoining to run a crosscut tunnel from a point 400 ft. from the entrance of the Little Alice tunnel, cutting through the Little Alice until it strikes the tunnel of the Houston. The work is considered very important.

London.—During the winter months large ore reserves have been blocked out and heavy shipments will begin in July. The vein has been followed a long distance, and is showing remarkable strength.

May Queen.—New lessees have resumed work through the Hayden shaft of this property. Steady shipments of a good grade iron material are being made.

Peerless.—Large bodies of milling and smelting ores have been opened up, and roads having been repaired, shipments will be steady from now on. The smelting ore shows 50 to 60 per cent lead, while the milling ore yields a good concentrate.

SAN JUAN COUNTY.

(*From Our Special Correspondent.*)

Galena Lion.—William Sullivan has started development on this group, near Red Mountain.

Little Maud.—Operations continue on a small scale pending negotiations for a sale to Eastern men.

Red Rogers.—Mrs. H. A. W. Sabar has arranged to resume work with a large force.

Trilby Mining Company.—Lumber for new buildings and supplies are being taken to the mine, near Silverton, and work will start at once.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Almost all of the mines have closed down for the national holiday, and some of them for two days. Of course, those that are pumping water are not entirely closed.

Mr. Waldemar Lindgren and his assistants of the United States Geological Survey, have been taking a preliminary look over the district, and are now ready for the work of collecting data upon which to make the report on the district.

A strike has been declared at the Standard Mill of the United States Reduction Company, in Colorado City. This is the outcome of the trouble some time ago between the mill management and the union, which was adjusted temporarily about April 1. Just what effect this will have in this district cannot yet be told, but between this and the smelter strike in Denver, the outlook is certainly not very bright.

Drainage Tunnel.—It is thought that this tunnel will be completed about 15 days before the time called for in the contract, as it has now only a little over 1,000 ft. to go, and the time for completion called for is September 1. During the month of June only four headings were worked, as one of the headings was troubled with water. In these four headings 665 ft. of work was done, averaging a little over 22 ft. per day. Some very rapid work has been done on this tunnel.

Empire State Gold Mining Company.—This property was shut down completely about the middle of the week, no reason for so doing being given. This was a surprise to the employees and minor officials, as the mine had been shipping steadily. It was learned later that a complete change of ownership had taken place. Messrs. Williams, Kilborn and Doubt going out and Messrs. Spurgeon and Cassidy coming in. It is understood that work will soon be resumed on a large scale.

Little Bessie.—This property on Beacon Hill has

been closed down, whether permanently or otherwise is not known. A large amount of work has been done on this porperty, but up to the present no ore has been encountered.

Orphan Belle Gold Mining Company.—This company has filed a suit in the district court against the Isabella Company for the sum of a little over $1,250,000. This is due, it is alleged, for ore extracted from the ground of this company by the defendant company several years ago. The ground of this company is now owned by the Empire State Company, and adjoins the Isabella territory. Just what the ultimate result of this suit will be it is to early to tell.

Stratton's Cripple Creek Mining and Development Company.—The leases on this property are being let as fast as the management can satisfy themselves as to the desirability of the applicants. It appears to be the policy of the management to endeavor to get good reliable lessees.

GEORGIA.

LUMPKIN COUNTY.

(From Our Special Correspondent.)

Dahlonega Gold Mining and Milling Company.—At the annual meeting in Dahlonega last week, the following directors were chosen: L. P. Shope, T. R. Cravens, Robert L. Dismey, W. I. Rush and Joel T. Miller. The stockholders approved the work recently done by the directors. It was reported that the Bald Creek Ditch will shortly be completed, and work begun on the placer deposits on the east side of the Chestatee. The company is also preparing to put a dredge on the river, where it owns the rights for about two miles.

Singleton.—This mine, near Dahlonega, is now running regularly, under the charge of W. G. Campbell.

IDAHO.

SHOSHONE COUNTY.

J. B. McKenzie and J. L. Safford, who are working over the dumps of the Bunker Hill Mine at Wardner, made a shipment of concentrates recently.

Highland Chief.—The company recently closed a contract for the half of a 16-drill compressor, to be shipped at once and installed in three weeks, on their porperty in the Pine Creek District, near Wallace. About 14 men are employed developing the property and machinery, and supplies are being hauled to the mine.

INDIANA.

DAVIESS COUNTY.

(From Our Special Correspondent.)

James Epperson, mine inspector, and Joseph Clark, deputy factory inspector, report great activity in the coal mining regions of southwestern Indiana, and hundreds of people are compelled to live in tents and temporary sheds while houses are being built. Villages containing 200 people two years ago are now claiming populations of 1,500 and 2,000. The greatest gain has been in Greene, Sullivan and Dubois counties. The 42 new mines opened up there have attracted so many people that it will be impossible to build houses sufficient for all before winter.

Mandeback.—This coal mine is being improved. A switch is being laid to the mine, and the company will increase the capacity of the mine nearly one-half and employ 160 more men. The firm has contracted to furnish the Evansville & Indianapolis Railroad with fuel. The railroad will use nearly one-half the output of the mine.

ORANGE COUNTY.

(From Our Special Correspondent.)

A 7-ft. vein of coal of excellent quality is reported near Wycliffe. The depth is 80 ft. Coal men are flocking to the place, and the lands will be developed.

LOUISIANA.

CALCASIEU PARISH.

(From Our Special Correspondent.)

The Lyons Oil Company, of Mobile, Ala., has a new well in the southern part of the field. The Star Oil Company, capital $100,000, and the Alabama Oil and Development Company, capital $100,000, have been incorporated. Both companies will operate here.

Jennings Oil-field.—The Crowley Petroleum Co. has been incorporated with a capital of $100,000, and has started a well. The Layne Oil Company, which owns 10 acres in the proven field, is preparing to drill 3 wells, near Superior No. 1. The Church Rayne Oil Company has leased 1,400 acres in the eastern part of Acadia Parish. The Crowley Oil and Mineral Company is laying a pipe line between Jennings and Crowley, a distance of 14 miles, and has also let a contract for a 37,500-bbl. tank. Southern Oil Company No. 7 is in and is said to be producing 1,000 bbls. daily. La Fourche Crowley Oil Company intends to drill a well on its Jennings property. The Northern Oil Company brought in a good well at 1,800 ft. The drilling only occupied 14 days, a record for this field.

Welch.—Metropolitan Oil Company No. 2 has been started. Boss Oil Company No. 1 is going down rapidly. The Southern Pacific Railway Company's three wells are said to be producing only 50 bbls. each per day.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Atlantic.—This mine produced 338 tons of mineral in June, the largest output of any month in its history.

Centennial.—A new shaft and rock-house will be erected at shaft A. The bins of the new rock-house will have a capacity of 2,000 tons. It will be equipped with three 18 by 24-in. rock crushers. Sinking in shaft A is under way at a depth of 2,700 ft. The drift north at the 25th level is in 190 ft., south 175 ft. The blacksmith, carpenter and machine shops, all frame structures, will be moved one-half mile to the Kearsarge shafts.

Franklin.—This mine produced 379 tons of mineral in June. Ground for a new shaft, No. 2, has been broken at the Junior branch of the mine. The new shaft is 1,200 ft. south of No. 1 shaft, and the ground is proven by drift south from the latter.

Michigan Smelting Company.—The contract for the grading and masonry work for the power-house, storage bins, laboratory, machine shop and office of the new smelter has been awarded to the Northern Construction Company, of Houghton. The Wisconsin Bridge and Iron Company, of Milwaukee, through its local representative, J. F. Jackson, secured the contract for the structural iron and steel work.

Quincy.—The June production of this mine was 1,003 tons of mineral. No. 8 shaft, on the Mesnard property, is sinking to the 17th level, and shipping 250 tons of rock daily. Four drills are in commission in that shaft, 1 sinking, 2 drifting and 1 opening a winze.

COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

Ahmeek.—The Kearsarge amygdaloid lode has been opened for some distance and continues rich in copper.

Miskwabik Development Association.—Surface explorations are well under way. Trenches are being extended to open the outcrop of the Kearsarge lode.

Mohawk.—This mine produced 401 tons of mineral in June. The rock shipments were increased slightly over the previous month.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Mass Consolidated.—The June product was large, owing to the heavy yield of mass and barrel copper.

Michigan.—This company has secured a stamp mill site with 1½ miles of water frontage, ½ mile east of the Mass stamp mill, on Keweenaw Bay.

Victoria.—Sinking in No. 2 shaft has reached the 19th level. The lode maintains a fairly good mineralization. Drifting south at the 6th, 8th, 10th, 12th, 14th and 16th levels is under way. Fourteen drills are in commission.

MINNESOTA.

(From Our Special Correspondent.)

Matthew Lee, for many years with the diamond drill contracting firm of Cole & McDonald, has gone into business on his own account. He has some contracts on the Menominee Range, and will devote himself chiefly to the older districts. A number of new contracting firms have started the Mesabi in the past year, and all are now busy with, generally speaking, small equipments. The two older firms of E. J. Longyear and the Cole & McDonald Exploration Company are very busy, Mr. Longyear having more than 100 drills, chiefly churn. The other firm, with fewer churns but many more heavy diamonds drills, is doing all the Vermillion Range work, with the exception of a single drill at "section 30."

IRON—MESABI RANGE.

(From Our Special Correspondent.)

Grant.—Nothing is doing at this mine, of Jones & Laughlin, other than the shipment of the small stock accumulated during the winter, though it was planned to mine 100,000 tons during the present season. The Grant is a State lease.

Jordan.—All the ore in this mine has been uncovered. The mine will not ship as heavily this year as was expected.

Kinney.—This new mine of the Republic Iron and Steel Company has begun shipments over the Great Northern road, and will probably make about 75,000 tons this year. The mine has been stripped at heavy cost, and can easily make a very much larger shipment, if desired. It is a property of considerable size and of reasonably good grade. On part of it the royalty is but 18c. a ton.

Pickands, Mather & Co.—This firm is operating as new mines on the range the Troy, Utica and Albany. The Troy is in section 7, T. 57, R. 17, south of the Fayal; Utica is in section 2, T. 57, R. 21, and the Albany is in section 32, T. 58, R. 20. Troy began shipment this week from an ore-body of moderate size, and about 100 ft. deep. Quicksands and water delayed shaft sinking for months. There are now four pumps on the property, one of them a large duplex Prescott. It is the third wettest operating mine on the range. The lease was bought two years ago from A. Maitland, of Negaunee. Utica covers 100 acres in sections 2 and 11, and the shaft is sunk through the foot of the big Mahoning dump, the mine having been found after the Mahoning was stripped. It is partially an open pit property, and contains a large tonnage of excellent ore. The fee belongs to the West Missabe Land Company (Great Northern road) and Burrows & Rust. Albany was noted as having the deepest hole ever sunk in ore on a Misabi exploration. It was 430 ft. in ore. This is an 80-acre tract, the w. ½ of the sw. ¼ of section 32, T. 58, R. 20. The ore is good, and the body large. It was bought from Mr. Maitland when the Troy lease was purchased. The fee belongs to Laura A. Day, of Minneapolis, and the royalty is 25c. a ton. Pickands, Mather & Co. are also shipping from their Sparta, Malta, Corsica and Elba mines.

Pittsburg Iron Company.—This company is erecting buildings, grading tracks, placing machinery and opennig a mine in section 4, T. 58, R. 15, where it controls by purchase of the lease some 2,000,000 tons of ore belonging in fee to the Longyear Mesabi Iron Company, which carries a 35c. royalty, and is of good grade. The average royalty now obtained for Mesabi properties of reasonably good condition, is not far from 35c., of which the fee-holder customarily gets about 25c. The Pittsburg Company is to name its mine the Miller.

Stephenson.—Shipments from this mine for the year will be about 200,000 tons, unless some change is made in present plans. The mine has a shovel in ore, and is continuing its stripping. A second shovel is to be put into the stripping very soon, to continue all season.

IRON—VERMILION RANGE.

(From Our Special Correspondent.)

Mahoning Ore and Steel Company.—Drill exploration by this company on the eastern Vermilion has stopped, and the drills are now busy elsewhere. The company is still at work on the McComber property in section 14, T. 62, R. 14, between Tower and Ely.

MONTANA.

The report of Mr. B. H. Tatem, assayer in charge of the United States Assay Office at Helena, gives the metal production of Montana for 1902 as in the table below; comparisons being made with the similar report for 1901:

	1901.	1902.	Changes.
Gold, fine oz.	232,331	212,855	D. 19,476
Silver, fine oz.	14,180,545	13,629,739	D. 550,808
Copper, lb.	228,031,503	211,646,640	D. 16,384,863
Lead, lb.	11,504,892	8,177,629	D. 3,327,263

The gold reported was from the following sources: Placer dust, 21,626 oz.; mill bullion, 50,402 oz.; cyanide bullion, 62,459; from copper ores, 52,304 oz.; from lead ores, 4,360 oz.; from smelting ores, 21,704 oz. There was an increase of 5,445 oz. in gold from cyanide bullion, and of 6,454 oz. in that from copper ores; but decreases in the gold from all other sources.

The value of this production—using the average commercial value of silver, instead of the nominal coinage value given in the report—was: Gold, $4,400,095; silver, $7,109,270; copper, $24,606,038; lead, $332,747; total, $36,448,150. The lead and silver are valued at the average prices of the year, as given by the ENGINEERING AND MINING JOURNAL.

SILVER BOW COUNTY.

The mining companies have generally filed their statements with the county assessors for the year ending with June. With most of them, these figures are the only statements made public, and they are given for that reason, although by themselves they have very little importance, owing to the way in which they are compiled, and the fact that they are intended to meet only the limited requirements of the assessors. The statement of the Anaconda Mining Company shows net earnings for the year ending with June, 1903, of $1,589,610, which is an increase of precisely $300,000 over the previous year. The Boston & Montana reports net earnings of $4,053,465, which shows an increase of $2,413,770 over the previous year. The Montana Ore Purchasing Company puts its net earnings at $601,250, or almost exactly the same as in 1902; the gross earnings for last year were $3,587,691. The following statements purport show the average yield per ton, the cost of mining, cost of transportation to smelter and the cost of reduction at the smelter per ton:

	Gross.	Mining.	Transp.	Reduc.
Boston & Montana	$14.03	$2.16	$1.00	$3.05
Butte & Boston	7.90	3.27	0.16	2.44
Anaconda	10.48	3.49	0.15	3.39
Colorado Co.	.....	2.49	0.16	....
Montana Ore Pur. Co.	12.23	3.54	0.32½	3.62
Parrot	8.91	2.81	0.18	2.73
Washoe	10.45	3.79	0.15	3.08

The quantity of ore mined is reported as follows: Boston & Montana, 907,227 tons; Butte & Boston, 245,333 tons; Anaconda, 1,382,835 tons; Colorado Company, 235,680 tons; Montana Ore Purchasing Company, 293,332 tons; Parrot, 253,284 tons; Washoe, 106,588 tons.

Amalgamated Copper Company.—About 1,000 ranchers, whose farms had been damaged by fumes from the new smelter, were banquetted recently at the

smelter by the officials of the company, and were shown the improvements made to abate the fumes and smoke nuisance. The company has spent about $200,000 in settling claims for damages, and the same amount in building a gigantic flume 30 by 40 ft. in cross section and 250 ft. long to carry the fumes and smoke to a stack 300 ft. in height, erected on top of the hill.

NEVADA.

(From Our Special Correspondent.)

The judge of the court of the First Judicial District of Nevada has declared unconstitutional the eight-hour law for miners passed by the last Legislature of that State. As a result, there will be a fight between the miners and the opponents of the bill. The owner of a cyanide plant at Dayton rebelled against the law, and was arrested and fined $100. He appealed the case to the district court and the judge declared the law invalid on the ground that under the Nevada constitution no act of the Legislature covering two separate measures can be operative. The law makes eight hours a legal day underground and in reduction works also, but both these provisions were under one title. The decision is therefore on a technical point, and the unions will appeal to the Supreme Court.

NEW MEXICO.

GRANT COUNTY.

Silver City Reduction Works Company.—This company's smelting plant, situated near Silver City, is reported destroyed by fire. The plant is reported almost a total wreck, the loss being estimated at from $100,000 to $120,000, with only $15,000 insurance. It was owned by the Hearst estate.

OHIO.

The National Hocking Coal Company recently purchased 30,000 acres of coal land in Muskingum, Perry and Morgan counties for $500,000. The tract between 2½ to 4 miles wide and about 20 miles long, extends from near Roseville and Cannelville on the north to Porterville in Perry County.

PENNSYLVANIA.

BITUMINOUS COAL.

American Coal Company.—This company is about to be organized with a capital of $20,000,000, to take over the properties of the Pittsburg Vein Coal Company and the Pittsburg Steam Coal Company. Samuel C. Grier is president of the former company, while Henry Buhl, of Boggs & Buhl, of Allegheny, is president of the latter.

Seger Coal and Coke Company.—This company, of Pittsburg, has taken options on 1,000 acres of coal land near Jeannette, in Westmoreland County. It is expected to have the mines in running order by January. The company is capitalized at $300,000, and is erecting coke ovens at Ligonier, where it has 500 acres of land.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Grantz Gold Mining Company.—Placer mining is under way on the Roosevelt ground. Gravel and stream dirt is being sluiced as well as broken ore and gouge matter from the mine, all of which carries gold.

Interstate Mining Company.—The working force has been increased and the shaft started several months ago is being sunk as rapidly as possible. W. R. Milham, of Custer, is manager.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Homestake Mining Company.—One hundred additional stamps are being placed in the Amicus mill, increasing the number in that mill to 240 and giving the company a total of 1,000 stamps in the six mills. To operate the new stamps a new compound engine is to be installed at the mill. The installation of the engine will be commenced at once, and as soon as it is ready to run, the old engine in the opposite end of the mill will be removed, so that the present stamps can be operated while the others are being put in. The new air-compressor at the Ellison hoist is in commission. It is manufactured by the Ingersoll-Sergeant Company, and capable ot operating 150 drills at a time. The company will enlarge this compressor to 200 drills, as there is never a time when more than half that number are in use at once. A new building was erected at the Ellison hoist to house the large compressor. This will double the air-pressure in the mine, which had been growing inadequate of late years as the operations were becoming extensive. There were two compressors in use before, one at the Highland and the other at the Old Abe hoists. These may now be discontinued. T. J. Grier, the superintendent, says the report that the company was to build a new mill was a mistake.

TEXAS.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

Beaumont Oil-field.—The Heywood Oil Co. is drilling two more wells. The Meagher Syndicate well at Viterto, 4 miles south of here, is the only interesting wild-catter in this vicinity. They are looking for a pumper, claiming that other drillers passed the oil stratum while looking for gushers.

A survey for a pipe line between Welch Jennings and Beaumont, has been completed, and permission has been granted for the use of the highways. W. H. Rogers is promoting the proposition.

The Sour Lake boom is overshadowing Beaumont operations at present, although many wells on Spindletop are being deepened. The greatly increased production at Sour Lake has sent the prices for crude away down, and the market is weak and slow. Crude has dropped steadily from 78c. as low as 58 to 60c. a bbl., with prospects for a further decline. Buyers say that Sour Lake will be good for 25,000 bbls. daily in less than two weeks.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Settlements.—Salt Lake banks reported settlements to the amount of $1,604,510 in the month of June. The independent smelters forwarded to the Eastern refineries 2,546,686 pounds of copper bullion, all of which is not included in the bank statement. For the week ending July 3: Ores, $19,300; base bullion, $141,000; gold bars, $9,200.

Utah Dividends.—The mines reporting dividends in June made a showing of $338,000, as follows: Daly-West, $108,000; Silver King, $100,000; Grand Central, $25,000; Annie Laurie, $50,000; Gemini, $50,000; Sacramento, $5,000.

Utah Iron and Steel.—State Senator A. B. Lewis has announced that the articles of incorporation of this concern are to be filed in Colorado. Senator Lewis has acquired options on a large acreage of iron and coal lands situated in Iron and other southern Utah counties, which will form the basis for its organization. The capitalization will be $20,000,000, divided into 2,000,000 shares. The Senator says he is acting as agent for others, but declines to disclose their identity. It is believed that John C. Osgood, who recently retired from the Colorado Fuel and Iron Company, is the real power in the enterprise. Mr. Charles C. Parsons, his Denver attorney, has been in Salt Lake to confer with Senator Lewis. The latter states that the properties acquired will be opened on an extensive scale, and that it will serve as a rival to the Colorado Fuel and Iron Company.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Shipments.—For the month of June shipments amounted to 537 cars, as follows: Ajax, 5; Black Jack, 8; Bullion-Beck, 21; Centennial-Eureka, 138; Dragon Iron, 91; Eagle & Blue Bell, 7; Eureka-Hill, 35; Grand Central, 50; Gemini, 50; Joe Bowers, 2; Lower Mammoth, 11; May Day, 2; Martha Washington, 3; Mammoth, 38; Star Consolidated, 24; Uncle Sam Consolidated, 7; United Sunbeam, 1; Victor Consolidated, 12; Yankee Consolidated, 26.

WYOMING.

CARBON COUNTY.

Union Pacific Coal Company.—At this company's mine No. 1 at Hanna an explosion wrecked part of the mine workings, set the mine on fire and is reported to have caused the death of 213 men. Over 250 men, mostly colored, were at work. The mine is reported to have been well equipped and had adequate ventilation. The explosion was probably due to dust. E. S. Brooks is superintendent of the mine.

FOREIGN MINING NEWS

CANADA.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT.

Crow's Nest Pass Coal Company.—The output of the Morrissey Mine is expected soon to reach 1,000 tons a day. Bins for slack coal are to be constructed at the upper end of the coke ovens, large enough to contain supplies for the 750 coke ovens under construction.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Shipments.—The ore shipments for the week ending July 4 were: Le Roi, 1,920 tons; Center Star, 1,380; War Eagle, 1,920; Kootenay, 465; Le Roi No. 2, 450; Velvet, 50; Giant, 130. Total for the week, 5,585 tons; for the year to date, 185,422 tons.

Le Roi No. 2.—A contract was let recently for the buildings for the Elmore concentrating plant. The buildings cost about $7,000; the machinery is in transit from Montreal. One car of ore has been shipped to Denver, Colo., for tests in concentration.

BRITISH COLUMBIA—SLOCAN DISTRICT.

The total amount of ore shipped from the Slocan District for the year 1902 was about 30,000 tons. From Jan. 1 to June 13, 1903, the ore shipments totaled 6,392 tons.

NOVA SCOTIA—CUMBERLAND COUNTY.

Canadian Coal and Railway Company.—A fire broke out on July 3 in the No. 2 pit of the company's Joggins Mines, doing considerable damage to the timbering. About 200 miners were at work, but all escaped safely but one overcome by smoke. The output of the mines is about 300 tons of coal daily.

BY CABLE.

(From Our Special Correspondent.)

Sydney, N.S.W., July 8.—The Broken Hill Proprietary Company, whose mines at Broken Hill, New South Wales, were closed down on account of failure of the water supply, has just started 60 men to work in the stopes containing oxidized ores.

MINING STOCKS.

(Full quotations are given on pages 74 and 75.)

New York July 8.

The market is neglected, as professional traders are in need of news to interest investors who are not on vacation. Some capital, however, may be made of the annual statements filed by the subsidiary copper companies in the Amalgamated consolidation with the county assessors of Butte for purposes of taxation. These statements, unfortunately, are too meager to permit calculation of the real operations of the properties, although they show increased net earnings. Of the net earnings reported by Anaconda stockholders have received 75½ per cent as dividends, while Boston & Montana has declared 29.6 per cent. Together the dividends amounted to $2,400,000, which is equivalent to 42½ per cent of the total net earnings, leaving a balance of $3,243,075. Simultaneously the parent company, Amalgamated, declared dividends of $3,077,756, which is only $165,319 less than the balance reported by its two most important constituents. It is also noteworthy that Anaconda's earnings have been greatly impaired in late years, owing principally to the lower value of the ore extracted.

Dealings in Amalgamated are normal, and fluctuations in the quotations are only fractional. This week the extreme prices were $53.75 and $52.50. Anaconda continues to sell below par, having droped to $21 on Monday, but transactions are too small to attract attention. On curb the copper shares are doing a mid-summer business, the feature being Tennessee, as it is believed dividends will be declared semi-annually hereafter. Sales of Tennessee have been made at $31.75, which is $6.75 above par. Greene Consolidated, of Mexico, was in moderate request at $22.87½@$22.50, and United, of Montana, exchanged hands at $18.62½. A few hundred shares of British Columbia put the price at $4.50@$4.37½.

Ontario Silver, of Utah, after some weeks' absence, reappeared at $5.75.

Colorado gold stocks were hardly visible this week, and of the Comstock silvers the usual list afforded limited trading. Consolidated California & Virginia was dealt in at $1.55@$1.50; Ophir at $1.65@$1.75; Yellow Jacket at 80c.; Best & Belcher at $2.25, and Hale & Norcross at 75c. Further business has also been done in Silver Hill, the dividend stock, which stood at 90c.

Auction sales are not as frequent as they used to be, as holders of shares in antiquated properties or valueless prospects seem to find a better market by advertising in the newspapers or selling to irresponsible brokers who re-load them on the unsuspecting public.

Recently there was an auction sale of 50 shares of Peacock Copper Company, of California, at $12.50 (par $5).

Boston. July 7.

(From Our Special Correspondent.)

The Dominion securities have been the only stocks to show any strength or animation during the week. Sentiment in these stocks has undergone a complete change, although it is felt that the Dominion Iron and Steel Company must undergo reorganization. Dominion Coal under a good Canadian demand spurted $11.50 to $106.50, holding all but $1 of it. Dominion Iron also rose $3.75 to $21.25, reacting to $20.75. The strength of these stocks is due to reports that the Canadian Government would immediately make favorable announcement on the steel bounty.

The heaviness of Amalgamated Copper has had a depressing effect on the copper share list, and the continued weakness of the metal has also had an unfavorable effect. In local circles it is now felt that no increase will be made in the Amalgamated dividend. A local trader, who is usually well informed on Amalgamated matters, offered the dividend on 5,000 shares to-day at ⅝ of 1 per cent.

Utah Consolidated has lost $1.25 during the week to $28.25. New York parties are reported as being particularly impressed with this property, and a new interest there is reported to have taken over 5,500 shares of stock lately. It is pointed out that last

year, on an 11½c. copper market, the company earned $800,000 net. The company has been getting the benefit of 14c. and over for its copper this year, and, in addition, the smelter will be increased a third with money from the treasury. A $1.50 dividend has been declared, payable July 23.

Tamarack is unfavorably affected by its reduced output, the stock having fallen $12 to $105, with nothing between. The June product was but 510 tons of mineral, which is the smallest for the year, the average for the previous five months being 636 tons. The amount of rock treated was also greater for June.

Bingham Consolidated is off $1.75 to $26.50 for the week; Centennial, $1.37½ to $19.50; Copper Range Consolidated, $3.25 to $52.50; Michigan, $1.25 to $8; Mohawk, $1 to $44; Parrot, $1 to $21, and United States Mining, 87½c. to $21.50. Allouez is fractionally lower at $5.87½. The special meeting called for to-day was postponed for a week, as a correct description of the property to be exchanged with the Ahmeek had not been received.

Daly-West Mining dividends come along every month regularly at the rate of 60c., but the price holds around $43 per share. Central Oil boomed $2.25 to $9.50 last week on announcements that the company had sold its producing plant of some 200 barrels per day in Indiana for more than $1,000 per barrel production. The proceeds will be used as working capital. The present output is about 500 barrels per day.

Calumet & Hecla has lost $20 to $445 on stock demand. The June output was 3,450 tons fine copper.

Colorado Springs. July 3.

(From Our Special Correspondent.)

Labor troubles have again enveloped the mining stock market, and have inaugurated a state of affairs difficult to forecast. To-night the mill owners' union at Colorado City decided to inaugurate a strike in the Colorado City plants of the United States Reduction and Refining Company. The order does not include the new Telluride Reduction mill, nor the Portland mill at the same place, and from developments to date it appears to be more in the nature of a personal attack on certain interests which have been singled out, for reasons not yet made public. The spirit manifested on the part of the strikers is one of great bitterness and the outlook is ominous. The action on the part of the mill workers is incomprehensible and contrary to what has been expected of them, according to what has developed in mining circles of late.

Whatever of encouragement the market presented this week has been suddenly dissipated by the strike developments. C. K. & N. was a strong leader on the Exchange, selling up to 21½c. Isabella has been weak and wavering. A suit for $1,250,000 damages has just been commenced against the company by the old Orphan Belle Company, although the merits of the contention are hard to see. Moon Anchor, while not an active trader this week, is being talked of as a specialty that will bear watching this fall. This mine has been drowned out for several years below the 800-ft. point, and will soon be recovered through the relief which is promised by the new drainage tunnel. The balance of the market had little of real importance this week.

Salt Lake City. July 3.

(From Our Special Correspondent.)

This has been the dullest week of the year for mining stocks, the amount of money changing hands amounting to only $77,646. The market closed, however, with the traders in better tone, and with indications of better prices next week.

The heavy sellers were Tintic stocks, Star Consolidated leading. This stock sold to the amount of 24,700 shares, and closed higher. Lower Mammoth fell to 86½c., but stiffened to 77¾c. at the close, which was the high point. Grand Central brought $4.50@$4.52. South Swansea found a taker at 17c. Of the Park City stocks the Daly stocks and California were the principal ones, but none of them came out in large quantities. Daly-West ended the week stronger, and so did Daly-Judge. Consolidated Mercur held at about stationary figures, selling at $1.45@$1.46. Sacramento was exchanged to the extent of 15,500 shares, closing stronger. A bid for United States Mining was filled at $22.37½.

San Francisco. July 4.

(From Our Special Correspondent.)

This has been a short week, the exchange making the best of the holiday, and adjoining from Wednesday afternoon until Tuesday, July 7. Business was not heavy at all, and the brokers had little to do. Prices, however, were well maintained.

On the old exchange, Consolidated California & Virginia brought $1.65; Mexican, $1.25; Yellow Jacket, 76c.; Sierra Nevada, 72c.; Hale & Norcross, 71c.

On the San Francisco & Tonopah Exchange business was quite active, buyers having shown considerable interest, and prices were generally well maintained. Tonopah Belmont sold at $2.20; Montana Tonopah, $1; Tonopah Midway, 53c.; Tonopah North Star, 48c.; Gipsy Queen, 26c.; Lucky Tom, 14c. The total sales on the San Francisco & Tonopah Exchange in June were 241,160 shares, of a total value of $101,923.

On the Oil Exchange business was very light, showing, however, small change in prices. The general tone was not particularly strong. Home brought $3, while Monarch was in some demand at 55c.; Sovereign sold at 37c., and Junction at 21c. The monthly record of sales for the current year is as follows:

	Shares	Value.
January	267,019	$255,202
February	322,443	219,358
March	199,908	151,982
April	236,268	115,571
May	401,454	154,386
June	154,720	117,928
Totals	1,581,812	$1,014,427

It will be seen that June business was lighter than that for any preceding month this year.

Mexico. July 1.

(From Our Special Correspondent.)

Exchange on New York during the last week has been hovering around 242, 243 and 244, closing on Saturday at 243, but with very little doing.

The stock market for the week was a little more active, but sales were limited to a comparatively few properties, the favorites among which were: Cinco Senores going at $190; Victoria y Anexas, El Oro, at $295; La Paz, Matehuala, $720; Aldebaran, $100; Esperanza, $1,470; San Rafael, $470; and Amistad y Concordia at $85.

COAL TRADE REVIEW.

New York, July 8.

ANTHRACITE.

Although the weather continues hot, the demand for anthracite coal still remains quiet. All the coal shipped finds a ready market, although production continues at a high rate, and the July output will, in all probability, establish a record for that month. Very little coal is going into the storage yards, and it does not seem probable that the reserve stocks will be increased materially during July. The tonnage going to Buffalo is still large, although there is some delay in shipping up the Lakes, on account of a blockade at the lower Lake ports, where vessels find it difficult to get loads as promptly as they need them.

In the Chicago territory buying is reported heavy. Dealers find difficulty in filling their orders promptly, and householders are evidently determining to stock up in good season for the winter. This is the case, not only in Chicago, but in all the points served from that city as a distributing center.

In the Eastern cities the same disposition to stock up for the winter, in good season, is noticed everywhere. It is very seldom that dealers have had such a heavy trade at this time of year; not only the New York Harbor points, but towns all along the Sound, and farther east, in New England, are doing a very good business. The sales agents at New York not only have orders enough to cover the present month, but to ensure a good trade well into August.

Discounts were 10c. less on July 1. The July prices for free burning white ash coal, f.o.b. New York Harbor shipping port, are: Broken, $4.55; egg, stove and chestnut, $4.80. The better grades of steam coal continue to sell at about $3 for pea; $2.50 for No. 1 buckwheat, and $2@$2.25 for No. 2 buckwheat or rice.

BITUMINOUS.

The Atlantic seaboard soft coal trade is quiet. The car supply has been quite short this week, and the railroads are not making much headway in improving the situation. We hear that the shipments all-rail from mines to New England ports have been greatly curtailed, if not entirely stopped. An effort is being made to increase the number of available cars by giving them a shorter haul on the home lines to tidewater. As yet, however, no satisfactory results have been shown. It is supposed that the new traffic management of the Pennsylvania Railroad will get hold of things before long. Orders in the hands of shippers generally are plentiful, indicating seemingly that the supply of coal is short. Up to the present there has been enough coal for all purposes and nobody has complained much of the car shortage, but shippers are beginning to be cramped for a lack of coal and it will be heard very probably before long.

Trade in the far East is quiet. There are a number of orders from this territory held by shippers. Some of these orders have limited freights slightly under the market to take advantage of any drop that may come.

Long Island Sound trade is uninteresting, as inquiries are not as urgent as they were a few weeks past.

New York Harbor business needs nourishment, as the smaller sizes of anthracite seem to be affecting bituminous just now. Current quotations for bituminous range from $2.50@$2.85 per ton, f.o.b. New York Harbor.

All-rail trade is making a fair showing, but shipments are not up to what they were expected to be early in the season. The car supply is running from 25 to 50 per cent of the demand, and is rather averaging the lower figure. Transportation is excellent, coal running through to tide in 4 or 5 days.

In the coastwise market vessels are scarce and in demand. Freights are stronger. We quote current rates of freight from Philadelphia as follows: To Boston and Portland, 90c.; Salem, 90c.@$1.10; Portsmouth and Bath, 90@95c.; Newburyport and Saco, $1.10; Providence, New Bedford and the Sound, 80c.; Gardiner and Bangor, $1.05. Ten cents above these rates is asked to the farther lower ports. Quotations from New York Harbor are $1.10 to Boston, Portland and Salem, and 75c. to the Sound.

Birmingham. July 6.

(From Our Special Correspondent.)

The production of coal in Alabama has been cut down about 70 to 75 per cent through the suspension of work on the part of the United Mine Workers of America. The suspension started on July 1, the operators and miners in convention, after discussing the conditions and making offers and counter-offers failing to agree on a new wage contract June 30. The operators offered the miners a renewal of the old contract with an advance of 2½c. per ton on the maximum and minimum wage paid for digging. The miners demanded a 5c. advance on both maximum and minimum, semi-monthly pay-days and eight hours to constitute a day. The operators claim that the demands of the miners are excessive. When adjournment was taken the motion was offered by J. W. McQueen, second vice-president of the Sloss-Sheffield Steel and Iron Company, and was to the effect that the convention adjourn subject to the call of the president. Ed. Flynn, who is president of the miners' district organization, was the president or chairman of the joint convention, so this motion meant that negotiations were not broken off. There is some hope that the miners will consider the proposition of the operators, though no encouragement is given as yet. The United Mine Workers of America have nearly 14,000 members in Alabama. They have obeyed the mandates of the union well and all work has suspended except with the boiler men, who are keeping pumps going. Mines in Jefferson, Bibb, Blount, St. Clair, Marion, Shelby and Cullman counties are interested in the suspension. A few of the smaller mining companies in the counties named have signed temporary contracts, and are still in operation. The mines in Walker County are not interfered with by the suspension, and mines in Jefferson County, which employ convicts, are not hindered.

Chicago. July 6.

(From Our Special Correspondent.)

"There isn't any," is the answer of dealers in pig iron when asked about the market. This explains the whole situation, so far as it can be explained. The market is flat and a slump in prices seems imminent. The minimum of quoted figures for the last quarter—$14 Birmingham—has probably been shaded by as much as 50c., making the Chicago price $17.85 for Southern No. 2 on time delivery. Nominally, the price of No. 2 is $15, Birmingham, or $19.35, Chicago. The price of Northern continues practically the same as Southern; on spot deliveries Northern is perhaps leading Southern, at a premium of 50c.@$1. Southern, however, continues the leading grade in the few sales that are being made.

Coke continues in much greater supply than demand. The minimum of last week, $5, has perhaps been shaded 30@40c. on spot business; contract business is being done at $6, as a minimum, though few contracts of any size are being placed.

Cleveland. July 7.

(From Our Special Correspondent.)

The lake coal situation is becoming more serious as the weeks pass. The two days' holiday, which was occasioned by the Fourth and Sunday coming together, congested all of the Lake Erie yard with coal cars, and caused serious delays to the boats, which have been trying to get their ore cargoes lifted. Until the ore is out there will be no boats for coal, and it seems impossible that the movement will start with any speed until later in the week. The shipment has been something enormous, and the upper lake congestion has not abated in the least. The railroads have had more taken they could do in handling the ore which came to the docks without trying to reduce the stock piles in the least. The fact that the stock piles are crowded now, prevents the boats being unloaded upon dock; and the result is that vessels in the upper lake region are being seriously delayed. There is a little talk of further selling of coal, but nothing has been reported. The prices haev not changed from $2.45, for Pittsburg and West Virginia lump, and $2.35 for Ohio lump. The coke situation might be improved. The furnaces got over the Fourth with difficulty, and then immediately felt the shortage of coke because of the slack movement of Monday. The producers are get-

ting a little laggard about their movement of the material to the furnaces and the furnacemen are beginning to fear a recurrence of the shortage of the late summer and all fall of last year. The domestic supply of coal is all that could be desired. Prices have not changed. Coke price for the best grade of foundry is $4.25 at the oven, with furnace coke bringing about $3.25 at the oven.

Pittsburg. July 7.

(From Our Special Correspondent.)

Coal.—Another rise in the rivers last night permitted the shipment of about 1,000,000 bush. of coal to the lower ports. More would have gone out but the towboats sent down the river last week have not returned, and there were not more than half a dozen here. All the mines in the Pittsburg District, both river and rail, are in full operation to-day. The railroad car supply is good, and there are enough empty coal-boats and barges in the pools to keep the river mines in steady operation for some time. Prices are unchanged and the demand is good.

Connellsville Coke.—There was a slight gain in both production and shipment, but the output is from 2,000 to 3,000 tons less than normal. Prices are not as firm as a month ago. Furnace coke is quoted at $3, and foundry at $3.75@$4.25. The *Courier*, in its last report, gives the production in the region for the previous week at 247,801 tons, a gain of 257 tons. The shipments were 11,562 cars, distributed as follows: To Pittsburg and river tipples, 4,492 cars; to points west of Pittsburg, 5,320 cars; to points east of Connellsville, 1,827 cars. This was an increase of 26 cars.

San Francisco. July 3.

(From Our Special Correspondent.)

The local coal market continues quiet. Prices have been remarkably steady this year, and have shown the influence of the fuel oil competition. Dealers are generally well supplied with stocks.

Yard prices to dealers for Pacific Coast coals in large lots are as follows: Wellington and New Wellington, $8; Richmond, $7.50; Rosslyn, $7; Seattle and Bryant, $6.50; Coos Bay, $5.50; white ash, $5. Rocky Mountain coal in car-load lots is quoted at $14 for Colorado anthracite, and $8.50 for Wyoming and Utah coal. Eastern coal is rather nominal, but quotations are $14, ex-ship, for Pennsylvania anthracite, and $13 for Cumberland. Foreign coal in cargo lots sells as follows: Welsh anthracite, $13, nominal; cannel, $8.50; Brymbo and Wallsend, $7.50.

Foreign Coal Trade. July 9.

Except for a slight activity in West Indian trade, matters are very quiet. Very little coal is arriving from abroad now, though some continues to come in on contracts.

The quantity of coal imported into France in the first three months of this year was 2,743,950 tons, as compared with 2,736,960 tons in the corresponding quarter of 1902, and 3,038,240 tons in the corresponding quarter of 1901. British coal figures in these totals for 1,499,500 tons, 1,586,430 tons, and 1,882,880 tons, respectively; Belgian coal, for 876,400 tons, 924,740 tons, and 981,660 tons, respectively, and German coal, for 293,240 tons, 181,270 tons, and 157,720 tons, respectively.

For the first five months of the year Belgium imported 1,454,982 tons of coal and 127,887 tons of coke, against 1,275,246 tons and 90,485 tons, respectively in the same period of last year; but the returns show a reduction of English exports, included in this, of about 7,000 tons, while French increased 37,000 tons and German no less than 140,000 tons. The figures this year were: Germany, 954,870 tons; France, 242,418 tons; England, 229,957 tons. Belgian exports were 1,862,374 tons of coal and 331,598 tons of coke (five months of this year), France, of course, taking the largest quantity, 1,383,629 tons.

According to official returns just issued the aggregate imports of coal into Russia last year amounted to 174,000,000 poods, as against 192,500,000 poods in 1901.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of June 27, that the market remains quiet and slightly easier all round. Best descriptions, however, are still scarce for prompt shipment. Quotations are: Best Welsh steam coal, $3.48@$3.54; seconds, $3.36; thirds, $3.24; dry coals, $3.24; best Monmouthshire, $3.30@$3.36; seconds, $3.24; best small steam coal, $2.10; seconds, $1.98; other sorts, $1.86.

The above prices for Cardiff coals are all f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

There is no change to report with regard to the outward freight market, which continues quiet in all directions. Some rates quoted from Cardiff are: Marseilles, $1.45; Genoa, $1.56; Naples, $1.44; Singapore, $2.52; Las Palmas, $1.44; St. Vincent, $1.56; Rio Janeiro, $2.16; Santos, $2.64; Buenos Aires, $1.92.

IRON TRADE REVIEW.

New York, July 9.

In spite of all representations made to the contrary, the iron market continues a waiting one; moreover, this policy is beginning to have its effect, and concessions are reported on several lines, and there are indications that further reductions in price are possible. In pig iron, nothing is reported beyond a few small purchases for near-by delivery. The same is the case with billets, and sales are reported from Pittsburg as low as $28 for bessemer.

In finished material condiitons are very nearly the same. The building strikes have not been settled yet, and there is a prospect of further delay in adjustment. To these strikes are added the possibility of a general strike of machinists. At the meeting in Pittsburg last week, the Employers' Association offered an advance of 7½ per cent, but the men held out for 10 per cent, and the question is now being voted on by the various branches of the union. There is a movement also among the iron moulders for higher wages, the outcome of which is uncertain.

It is reported that orders for some 50,000 tons of rails are being negotiated in Germany. A significant fact also is that the bids received for the steel for the bridge over the East River between New York and Brooklyn are said to include several from foreign mills.

The report of the United States Steel Corporation for the quarter ending with June, which is published to-day, shows that the net earnings for the quarter, after deducting expenses for repairs, etc., were $61,568,235; sinking funds, depreciation and reserve funds amounted to $7,385,299, leaving a balance of $54,182,936; interest and sinking fund on bonds amounted to $9,120,000; dividends on preferred stock—1¾ per cent—were $17,859,839; dividends on common stocks—1 per cent—were $10,166,050. These payments make a total of $37,145,889, leaving a surplus of $17,047 for the quarter. The unfilled orders on hand July 1 amounted to a total of 4,666,578 tons of material, which is 75,415 tons less than was reported on July 1, 1902.

Birmingham. July 6.

(From Our Special Correspondent.)

The iron market in this section of the country is now a spot market, that is, sales being made are on quick delivery. The strike of the miners belonging to the United Mine Workers of America, or rather the suspension of work as they term it, has not affected the iron market in this section as yet. Only two furnaces are slated to go out of blast within the first fortnight of this month. The Lacey-Buek Company will make extensive repairs about Trussville furnace, adding a skip hoist to the plant and enlarging the furnace. Iron manufacturers prepared for the strike among the coal miners laid in good stocks of coal and coke and are now fixed for four or five weeks and longer. The Sloss-Sheffield Steel and Iron Company has six of its seven furnaces in full operation. One of these will shortly need some repairing and if the coal miners' strike continues it is not improbable if it will not be blown out. This company has some mines in Walker County not affected by the strike. Then the Flat Top mines in Jefferson County are operated by convicts. The company also has a contract with concerns in Virginia for coke, and this will furnish all of that product needed. The Tennessee Coal, Iron and Railroad Company has mines at Pratt City in which convicts are worked, and it is believed that they will not be troubled. Other companies have arrangements for a good supply of coal and coke.

The shipments of pig iron from this district are about as strong as they have been for the past month or two, but are not equal to the production.

The following quotations are given: No. 1 foundry, $15.50; No. 2 foundry, $15; No. 3 foundry, $14.50; No. 4 foundry, $14; gray forge, $13.50@$14; No. 1 soft, $15.50; No. 2 soft, $15. It is stated that some non-Association furnaces are selling their product at 50c. under the prices above given.

There is not much doing in the way of production in the finished iron and steel lines, the rolling mills in this district now being off for the usual summer rest and for repairs. The mills will probably remain closed down for three or four weeks, the duration of idleness probably dependent on the strike of the coal miners. There is great activity at the steel plant at Ensley. In the steel rail mill department especially there is much activity. Sixty-foot rails are being manufactured on a quick order.

Foundries and machine shops, iron works and other plants of a similar nature are feeling a little drop in conditions, though there is more business being done at these institutions than at this time last year.

The new furnace of the Central Coal and Iron Company at Holton, in Tuskaloosa County, is finished and ready for operation. No time has been set yet for the blowing in of the furnace. The new furnace of the Alabama Consolidated Coal and Iron Company at Gadsden is also ready, but will not be blown in until the strike of the miners is over.

Chicago. July 6.

(From Our Special Correspondent.)

The coming of July and the consequent advance in price of 10c. has apparently made no difference in sales of anthracite, which continue as large as in June. Egg is still scarce, being greatly in demand for both city and country trade. Receipts and shipments of anthracite continue heavier than last year at this time. The new price of anthracite, egg, stove and chestnut, is $6.55. Retailers are getting $1@$1.20 more than this price.

For bituminous, the market continues quiet, except for Hocking and Eastern gas coals, which are in good demand. Hocking brings $3.50; Youghiogheny, $3.70; smokeless (in light demand), $3.40@$3.50. Indiana and Illinois continue in poor demand at $2 for lump and $1.75 for run-of-mine. There is much talk about ways of putting the market for Western coal in a healthier condition, but no definite plans seem to be made yet. Competition in these grades is keen, and seems bound to continue so.

Cleveland. July 7.

(From Our Special Correspondent.)

Iron Ore.—The lake docks are congested more seriously than they have been in all the preceding weeks of the season. Over 500,000 tons of ore is afloat at Lake Erie docks, and the cars are not available with which to move the material to the furnaces. As a result, boats are being held eight and ten days waiting to get their cargoes lifted. The demand for boats at the head of the lakes is strong, and rates have an upward tendency. The freights are 80c. from Duluth; 70c. from Marquette, and 60c. from Escanaba. Nothing is being heard of ore sales. The price is unchanged at $4.50 for bessemer old range and $4 for bessemer Mesaoi.

Pig Iron.—The demand for foundry pig iron is fair, and the market hears a few inquiries for contract material for second half, but without business. Southern furnaces are also inactive, and the general tendency of the whole market is to wait. Gray forge irons are sold in small lots, but that market is not over strong. The prices are $18.50@$19, Valley furnace, for No. 2 strong foundry, and $18@$18.50 for gray forge. Bessemer is off the market with nothing being done for fourth quarter. The price ranges between $18.50 and $19.35, in the Valleys for bessemer. The whole market seems to be a waiting one as the buyers are not ready to cover. Production has been fairly brisk and the consumption fully up to the output.

Finished Material.—The demand for structural is brighter. The market has heard an inquiry from a local concern for 1,500 tons of shapes for second half delivery, but the contract is temporarily withheld. The small mills are getting but little if any premium business, and the jobbers get their share, but the market is slow, quotations being 1.60c., Pittsburg, from the mill, and 2.15c., Cleveland, out of stock. Plates have been in better demand. Specifications have been heavier and the new orders have been small but numerous. The whole tone of this market is brighter. The small mills are fairly well sold up, and the larger mills are called upon to meet the needs of the consumers who have been depending upon the premium mills. The prices are: 1.60c., Pittsburg, for the product of standard mills, and 1.75@1.80c., Cleveland, on mill sales from small concerns. Bars have been inactive, with no market, while the mills have shut down for repairs. There is still some talk of further cuts on bar iron, but these are without confirmation, as few of the mills are in operation. The steel product is in good demand at 1.60c., Pittsburg, for bessemer; 1.70c., Pittsburg, for open-hearth, and 1.70@1.80c., Cleveland, for bar iron. The sale of bessemer billets is increasing, and the market looks to be healthy if not strong. The price ranges about $28.50@$29, Pittsburg, for bessemer. The demand for sheets has been only fair, and the market not very lively. The talk of cuts in prices of material has not lessened, but has grown with promulgation, and yet the statement is warranted that there has been no general slashing of prices. The prices are based on No. 27 black sheets, out of stock, 3.15c.; and for No. 27 galvanized sheets, out of stock, 4c. The rail trade is quiet.

Old Material.—There is really no market to quote, as all prices would be nominal, no business whatever having been done.

Philadelphia. July 8.

(From Our Special Correspondent.)

Pig Iron.—The only noticeable change in the pig iron situation from last week is an admitted increase in inquiry from larger consumers. Brokers and agents are not able to report very much progress. There is still a disposition to ask quotations on large lots, and then whittle down the order to small lots on the same terms. Large consumers, who have been buying from the same companies from year to year, are taking quotations from every concern in the trade that has the iron they can make use of. There has also been considerable negotiation or inquiry within the

past few days from representatives of Alabama iron, and it is intimated to-day that some business is likely to drift that way on account of additional concessions quietly made, the truth of which cannot be verified. The actual business transacted does not foot up very much, and brokers are somewhat disconcerted over the continued hesitancy of so many large interests, whom they know to be very short of iron. Some assert that the pig iron makers are in a stronger position than they actually appear to be, judging by market quotations now and two or three months ago. They claim that the consumptive requirements will take care of all the iron made. The views of buyers do not correspond. The larger buying interests are very confident that nothing can arrest the present tendency to a lower level, while they admit that a vast amount of iron will be wanted this fall. Quotations may be given at $19.50@$20 for No. 1; $18.50 for No. 2; $18 for standard gray forge, and $17.50 for ordinary; $18.50 for basic.

Billets.—Competition is more apparent in billets without resulting business of any magnitude. The only sales traced up within a few days were small lots, but to-day there is something going on which looks as though large transactions were momentarily probable. Eastern producers are showing more anxiety for business, and it is the belief in our best informed circles that a liberal distribution will take place in July at something less than prices quoted to-day. The advices are contradictory.

Merchant Bar.—The anxiety to pick up large orders for merchant bar is doing more to depress prices than any real over-production. There are so many scattered small mills in this State, which must have business, that the first symptoms of difficulty in obtaining business starts the weaker concerns to scrambling for it. That is about the present condition. Careful inquiry shows that the better equipped bar mills are not badly off for business, but they are making strong efforts to get more. Nominally, quotations will remain just where they were, but a shading of prices seem to be the only thing to look for.

Sheets.—Our reports to-day from sheet makers when sifted are practically a repetition of conditions referred to for the past three or four weeks. There is a good deal of work at the mills ,and there is enough to come in to keep the mills sold ahead about as they have been. The demand for galvanized has been particularly active, and also for heavy sheets. Card rates have not been shaded.

Merchant Steel.—There are some parties in Eastern States who are considering the advisability of making themselves safe as to merchant steel stocks very early in the buying season. The manufacturing interests have these prospective buyers in hand, and it is probable that the outcome, of anxiety on one side and of necessities on the other, will lead to considerable business upon a concession of prices which will be satisfactory. The hardware industry is using up a good deal of stock at various kinds, but all of these interests have been very cautious.

Skelp.—The only thing that could be dug out this week is that the large buyers of material are quite anxious to place their orders. Some business has been sent to mills within three or four days.

Plates.—Plate makers decline to admit that they are catching up to demand fast enough to jeopardize current quotations, but this seems to be a strained view of the situation. Makers say that nothing but a break in raw material will enable them to cut prices on their product.

Structural Material.—Reports to-day as to the placing of large orders for structural material are not quite so conclusive as two weeks ago. Buyers are keeping themselves well informed as to the condition of mills, and as the mills become able to deliver more promptly buyers are less urgent. Although it is true that most of those who buy in small lots for quick delivery are paying top prices.

Steel Rails.—It is claimed here by parties on the inside among buyers that there is not going to be as much ordering for 1904 delivery as there was for 1903.

Scrap.—The scrap market is flat and very little material is changing hands. Holders of steel scrap, railroad scrap and the like are simply gathering in all they can, and are awaiting developments.

Pittsburg. July 7.

(From Our Special Correspondent.)

The iron and steel markets are very quiet, but this condition is not unusual for this time of the year. Many mills are closed for necessary repairs, and inventory, and will remain closed for from two weeks to one month. Stocks of finished material in the hands of jobbers and consumers are decidedly low, and have been for nearly three months, buying being only for immediate requirements, as a decline in prices was expected at any time. This expectation, however, was not realized, as prices have been firm in all lines of finished products. Confidence in the markets, it is believed, has been fully restored, and there is every indication that a good fall buying movement will shortly set in. In finished lines prices now ruling are likely to be continued throughout the year, with but few exceptions. Sheets, tin-plate and pipe may advance in price, and, with a settlement of the building trades strikes, prices of structural material may become firmer as it has been gradually becoming one of the weak features of the market. No new business has been offered in this line for some time, but all the mills have been busy on old orders. Many mills are sold for several months ahead. The only feature of any consequence this week is in steel rails. Fully 100,000 tons have been contracted for within the past few days, increasing the tonnage for next year to over 600,000 which, with the 400,000 tons that it is now certain will have to be carried over from this year, makes over 1,000,000 tons booked for 1904 delivery. The United States Steel Corporation has obtained about three-fifths of the new business placed.

The pig iron market has been decidedly dull, and prices seem to be weaker for foundry and gray forge. Prices for these grades have been abnormal and a cut will not have any serious effect on the market. The threatening strikes of machinists and iron molders has deterred foundries from buying more iron than was actually needed for immediate use. As a result there has been a decline, but furnaces are not making any stiff cut to induce buying, as all are well sold up in the third quarter, and are not anxious to take on new business at present. The outlook is considered entirely satisfactory, and good prices are expected to prevail after fourth quarter buying begins. There is considerable inquiry for pig iron for late shipment, but large contracts are not being made. The Corporation, it is understood, will buy for the last quarter, but the Bessemer Furnace Association does not seem inclined to make the concessions in price desired.

Contrary to expectations the machinists' wage scale remains unsettled. The manufacturers offered an advance of 7½ per cent, as a compromise, but the workers held a meeting and decided to insist on an increase of 10 per cent. The matter has been referred to the national executive board and a vote is being taken. P. J. Conlon, first vice-president of the International Association of Machinists, came to Pittsburg this morning, and is awaiting the result of the ballot. If the board sanctions a strike another effort will be made to hold a conference with the manufacturers before the strike order is issued. All the machinists are at work pending the decision of the board. It is believed to-day that a strike may be averted, but the officers of the organization decline to express an opinion. A strike of iron molders is scheduled to take place next Monday, unless the national executive board of their organization orders them to accept the compromise rate of $3.10 a day offered by the manufacturers.

Pig Iron.—The buying of pig iron during the week was confined to a few small lots. While there has been considerable inquiry no business for the fourth quarter has so far been placed. Bessemer pig iron is quoted at $19, Valley furnaces, for prompt shipment, and $18.60@$18.75 for future delivery. Foundry No. 2 has been quoted as low as $18.75, Pittsburg, but sales of several small lots have been made up to $19.25. Gray forge is held at about 50c. a ton lower than foundry.

Steel.—Some fairly good sales of billets have been made, but at lower prices than prevailed a month ago. The lowest rate named for bessemer billets has been $28 at mill. The United States Steel Corporation has sold at that figure. Some small lots of bessemer billets have sold at $20, Pittsburg. Steel plates and bars remain at 1.60c.

Sheets.—The black sheet market is firm. Considerable business for early delivery has been placed during the week, but there is no active buying for extended shipment. The leading producer continues to quote No. 28 gauge black sheets at 2.75c., and galvanized at 3.85c.

Ferro-manganese.—There is no change in the market quotations for foreign ferro remaining at $50@$52.50.

St. Louis. July 6.

(From Our Special Correspondent.)

Pig Iron.—The dull season continues, but with no break in price, and no orders of pronounced tonnage booked. Iron users of the Valley are reticent about making any but small purchases, enough to run from week to week. Several St. Louis agents have withdrawn their road forces in this section, and are not looking for business at present figures.

Finished Material.—Jobbers and mill agents are doing good midsummer business, with shipments and collections in good shape. Buyers are watching crop reports in the South and Southwest before covering for the fall requirements. Special shapes of building material, and railroad supplies are in brisk demand.

New York. July 8.

Pig Iron.—The market is very quiet. The large buyers are still holding off, and orders are mostly for small lots for immediate use. Foundries, however, are still fairly busy, and a good deal of iron is being used. Quotations remain about the same. For Northern iron at tidewater prices are: No. 1X foundry, $19.50; No. 2X foundry, $18.75; No. 2 plain, $18.25. Southern iron can generally be had at some concessions, and quotations on dock, New York, are: No. 1 foundry, $19; No. 2, $18.25; No. 3, $18; No. 2 soft, $18.50. These prices might be shaded, if there were any large orders in the market.

Bar Iron and Steel.—Quotations are unchanged, prices for large lots on dock being as follows: Refined bars, 1.80@1.90c.; soft steel bars, 1.75@1.90c.

Plates.—Plates are still quiet, and not much change is expected until the labor situation improves. Prices are unchanged, and sheared plates are quoted: Tank, ¼-in. and heavier, 1.80@2c.; flange, 2@2.05c.; marine, 2.10@2.20c.

Structural Material.—Local buying is light, builders making few demands on account of the labor troubles. For large lots at tidewater nominal quotations are 1.75@2c. for beams, angles, channels and tees. Smaller lots are hardly quoted, but no premiums are being paid.

Steel Rails.—The quotation remains $28 for standard sections, f.o.b. mills for 1903 delivery; light rails, $33@$36, according to weight. Relaying rails are $28@$30 for heavy sections and $33@$35 for light sections.

Cartagena, Spain. June 13.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—During the week shipments included two cargoes, 6,430 tons manganiferous ore, to British ports. Since our last report chartering has been restricted, owing to the unsettled position due to the recent strike. We are pleased, however, to be able to state that during the last week the miners' and smelters' strike came to an end, the miners having resumed work gradually of their own accord. Several of the smelting works, however, have not again put their furnaces into blast, and therefore the men remain out of work. This will probably serve as a warning to the men and their unions for the future. There is no doubt that, considering the low prices of lead, iron and spelter it would in many cases be almost favorable to the mine owners and smelters to shut down work altogether rather than have to contend with the hositility of the laborers in addition to all the other unfavorable circumstances at present connected with mining in this country. Under the present situation it is daily making more apparent the necessity of a rapid move in the direction of the adoption of the installation of mechanical power both for mining and shipping purposes in this district, whereby a big reduction can be made in the employment of unskilled labor, otherwise increasing pressure of competition in the many new districts which are being opened up will put Cartagena out of all bounds.

Prices are firm at 6s. 9d.@7s. per ton, f.o.b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. 6d. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 10s. 6d. per ton, f.o.b. Cartagena. No shipments have been reported this week.

CHEMICALS AND MINERALS.

(See also Prices-Current, page 76.)

New York, July 8.

The end-week holiday made trade quieter than usual, but considering that this is vacation time nobody has been seriously inconvenienced.

The business actually being done is of a hand-to-mouth character, supported by the cutting of prices by sellers who have surplus stocks to be disposed of before fall buying commences.

Imports are moderate, and very little seems to be done in the export trade. All around ocean freight rates are easier, and for future shipments there is a willingness to charter at present quotations.

Cyanide of Potassium.—An expression of half-hearted buying intimates that sellers would be willing to shade their price of 20c. per lb., f.o.b. New York, but contracting in a large way cannot be influenced just yet.

Bleaching Powder.—Orders are so few that the market appears to be asleep. The fact is, everybody is so loaded up with bleach that no matter how low prices may be quoted no more stock can be taken. In some cases consumers are even obliged to cancel deliveries. Good imported bleach can be bought at $1@$1.12½ per 100 lbs., f.o.b. New York, and domestic at 75c.@$1, f.o.b. works.

Copper Sulphate.—In the absence of any large orders, the market continues weak at $4.25@$4.50 per 100 lbs., f.o.b. New York, according to seller.

Acids.—With the exception of sulphuric acid, trade is quiet. Prices generally are unchanged.

We quote as below, per 100 lbs., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°....	$1.50	Oxalic, Com'l..	$5.25@$5.50
Muriatic, 20°....	1.60	Sulphuric, 50°,	
Muriatic, 22°....	1.75	bulk, ton ...	13.50@14.50
Nitric, 36°.....	4.37½	Sulphuric, 60°..	1.05
Nitric, 38°.....	4.75	Sulphuric, 60°,	
Nitric, 40°.....	5.00	bulk, ton ...	18.00@20.00
Nitric, 42°.....	5.37½	Sulphuric, 66°,	1.20
		bulk, ton ...	21.00@23.00

Brimstone.—Market conditions are practically unchanged, as there are no large orders to influence prices. Best unmixed seconds on spot can be had at $22.25 per ton, and for shipment at $22@$22.25. Best thirds are about $1 less than seconds.

Pyrites.—Several cargoes of iron pyrites have recently arrived at Atlantic ports, which are being delivered on contract. Ocean freight rates from Spain are easy.

We quote: Domestic pyrites, $5 per ton for lump ore, f.o.b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites, carrying from 46@52 per cent sulphur, are quoted at 11@12c. per unit for lump and 10@10½c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—Business is quiet, and prices notwithstanding arrivals, continue firm. Spot and nearby supplies are quoted at $2, and futures at $1.97½ @$2.

The Chilean Government is advertising extensively for bids for nitrate lands to be sold at auction in Santiago, on November 20. Apparently the Government is desirous of interesting American capital, since the British and Germans are already large operators. It is also evident that the Chilean producers' combination may be inconvenienced by these new land sales, when a renewal agreement is considered in April, 1905.

Messrs. Mortimer & Wisner's monthly statement of nitrate of soda, dated New York, July 1, gives the following interesting statistics:

	1903. Tons.	1902. Tons.	1901. Tons.
Imp. into Atlantic Ports from W. Coast S. A., from Jan. 1, 1903 to date..	110,692	63,481	91,797
From Europe	.....	.....	.....
	110,692	63,481	91,797
Stock in store and afloat July 1, 1903, in N. Y.	2,600	227	8,325
Boston	.....	.....	133
Philadelphia	1,620	.....	.....
Baltimore	5,375	.....	100
To arrive, due Oct. 15, 1903.....	52,000	68,933	49,600
Vis. supply to Oct. 15, 1903.....	61,595	69,160	58,158
Stock on hand Jan. 1	7,800	10,000	1,793
Deliveries past month	20,202	18,147	13,312
Deliveries since Jan. 1	108,897	73,600	85,032
Total yearly deliveries	.....	179,613	175,176
Prices current, July 1	2c.	2c.	1.82½@1.85

Sulphate of Ammonia.—Dealers report business quiet. Good gas liquor is quoted at $3.15@$3.17½ per 100 lbs., f.o.b. New York.

Phosphates.—Orders are moderate, as miners are determined to wait for better prices instead of booking more long-time contracts at present market quotations.

Charters are more frequent, especially from Tampa. To Stettin, Germany, 15s. ($3.60) has been booked for August sailing, and to Swansea, Wales, at 12s. 6d. ($3), July.

The shipments of phosphates from Florida in May were 39,844 long tons high-grade rock, and 27,458 tons land pebble; making a total of 67,302 tons, principally for European consumption. In the five months ending May 31 the rock shipments amounted to 200,586 tons, which is 31,393 tons larger than last year; and the land pebble, 107,281 tons, or 23,159 tons less than 1902. In other words, the shipments of both rock and land pebble amounted to 307,867 tons, against 309,633 tons in the corresponding five months last year. Of this year's total 250,342 tons, or 81 per cent, went abroad, chiefly in rock to Germany, which compares with 217,727 tons, or 70.3 per cent in 1902. The difference is explained by the curtailment of domestic shipments of land pebble to meet the increased export trade.

In May the shipments of Tennessee phosphate rock through Pensacola amounted to 11,287 tons, making 43,992 tons in the five months since January, as against 36,586 tons last year; showing an increase of 7,406 tons. The bulk of this has gone to Italy, France and Great Britain.

Shipments of phosphates from Africa in May were 27,715 metric tons from Bone, and 23,840 tons from Sfax; total, 51,055 tons. In the five months ending May 31, Bone shipped 124,035 tons, and Sfax 113,651 tons; a total of 237,686 tons, which is somewhat less than the exports from Florida as noted above.

Phosphates	Per ton F. o. b.	United Kingdom or European Ports. Unit.	Long ton.
*Fla. hard rock (77@80%)	$7.00@$7.50	7¼@7¾d.	$11.31@12.09
*Fla. land peb. (68@73%)	3.50@ 3.75	5½@5¾d.	7.70@ 8.05
†Tenn., (78@82%) export	4.00@ 4.25	6½@7d.	10.40@11.20
†Tenn., 78% domestic	3.75@ 4.00	.....	.....
†Tenn., 75% domestic	3.50	.....	.....
†Tenn., 73@74% domestic .	2.95@ 3.20	.....	.....
†Tenn., 70@72% domestic..	2.70@ 2.95	.....	.....
‡So. Car. land rock.....	....@ 3.25	.....	.....
‡S. Car. riv. r'k ($5@66%)	2.75@ 3.00	5⅛@5⅝d.	5.95@ 6.53
Algerian (63@70%)	.....	5½@6¼d.	7.37@ 8.38
Algerian (58@63%)	.....	5¼@6d.	6.30@ 7.20
Gafsa (Tunis)	.....	5¼@6d.	6.30@ 7.20
Christmas Isl. (80@85%) .	.....	7¼@7¾d.	12.04@12.87

* Fernandina, Tampa, Brunswick, Savannah or Port Inglis. † Mt. Pleasant. ‡ On vessels, Ashley River.

Liverpool. June 30.

(Special Report of Joseph P. Brunner & Co.)

The demand for most lines of heavy chemicals is only moderate, but prices are fairly steady.

Soda Ash is steady. For tierces, nearest range is about as follows: Leblanc ash, 48 per cent, £5 10s.@ £5 15s.; 58 per cent, £6@£6 5s. per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces.

Caustic Soda quiet, as follows: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s., net cash. Special quotations for the Continent and a few other export quarters.

Bleaching Powder is very idle on spot, and £3 5s.@ £4 per ton, is nominal range for hardwood packages, as to market.

Sulphate of Ammonia is well held at £13@£13 5s. per ton, less 2½ per cent for good gray 24@25 per cent in double bags, f.o.b. here.

Nitrate of Soda is rather dearer on spot, sellers now quoting £9 15s.@£10 per ton, less 2½ per cent for double bags, f.o.b. here, as to quality.

METAL MARKET.

New York, July 9.

Gold and Silver Exports and Imports.

At all United States Ports in May and Year.

Metal	May. 1902.	May. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports....	$1,968,407	$14,488,268	$19,884,712	$18,819,895
Imports....	1,497,053	1,462,845	9,100,887	10,600,646
Excess.	E. $471,354	E. $13,025,423	E. $10,783,825	E. $8,219,249
Silver:				
Exports ...	$3,785,305	$2,148,412	$19,277,968	$15,875,563
Imports....	1,946,811	1,613,183	10,417,885	8,289,993
Excess.	E. $1,838,494	E. $535,229	E. $8,860,083	E. $7,585,57

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending July 8, and for years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess. Exports or Imports.
Week ...	$2,784,909	$32,786	$289,415	$59,727	E. $2,981,841
1903.....	23,943,989	3,538,821	9,917,481	1,167,488	E. 29,155,171
1902.....	16,504 786	1,246,071	14,142,280	2,065,851	E. 28,715,021
1901.....	25,745 294	1,457,744	17,849,742	2,404,143	E. 40.070,441

The gold exported this week went to France and Germany; the silver principally to Havre and London. The gold and silver imports were principally from Colon and Tampico. To the year's totals of gold and silver exports are added shipments too late for the preceding week's report.

Financial Notes of the Week.

In addition to the gold which has been sent from New York to Argentina this year, a considerable amount has been forwarded to that country from South Africa direct. These transactions have been, of course, on London and Paris accounts; but it has been found that the shipments can be made from New York and from the Cape of Good Hope somewhat more economically than by carrying the gold first to London.

The first shipments of gold from Australia to San Francisco in some time are announced, and late dispatches say that $1,500,000 is now on the way.

Exports of gold from New York in the first part of the week was $2,500,000 to France and Germany.

The statement of the New York banks, including the 56 banks represented in the Clearing House, for the week ending July 3, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts .	$889,466,900	$910,883,200	$917,444,200
Deposits	965,285,100	958,647,500	903,892,900
Circulation	30,578,800	31,683,800	43,909,100
Specie	169,864,100	173,116,800	159,302,300
Legal tenders	76,668,700	76,629,800	75,048,600
Total reserve	$246,532,800	$249,746,600	$234,350,900
Legal requirements ..	241,321,275	239,661,875	225,973,225
Balance surplus ...	$5,211,525	$10,084,725	$8,377,675

Changes for the week, this year, were increases of $3,697,300 in loans and discounts, and $173,100 in deposits; decreases of $179,500 in circulation, $4,467,900 in specie, $35,000 in legal tenders, and $4,546,175 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings at the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd.	$173,116,800	.....	$159,302,300	.....
England	188,350,040	.....	186,555,940	.....
France	512,959,440	$224,797,715	500,785,975	$224,886,640
Germany ...	183,335,000	64,415,000	163,590,000	57,480,000
Spain	70,815,000	98,445,000	72,800,000	103,640,000
Neth'l'ds ...	24,250,000	34,086,000	19,703,000	33,261,000
Belgium	15,650,000	7,825,000	14,803,335	7,401,665
Italy	80,775,000	10,505,500	92,560,000	11,325,000
Russia	375,230,000	44,475,000	392,780,000	44,925,000

The returns of the Associated Banks of New York are of date July 3, and the others July 2, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Silver continues steady at 24⅜d. India does not at present seem very active, and the bazaars are not doing much. Outside orders and shipments to France have absorbed most of the offerings.

The Treasury Department, on July 6, purchased 84,000 oz. silver for account of Philippine coinage. The average price paid was 53.45c. per ounce delivered.

The United States Assay Office in New York reports receipts of 31,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to June 25 are reported by Messrs. Pixley & Abell's circular, as follows:

	1902.	1903.	Changes.
India	£3,503,045	£3,233,025	D. £270,020
China	39,970	205,843	I. 165,873
The Straits	70,550	326,079	I. 256,529
Total	£3,613,565	£3,764,947	I. £151,382

Receipts for the week were £47,000 in bar silver from New York, and £17,000 from Australia; total, £64,000. Shipments were £76,000 in bar silver to Bombay, and £80,000 in Mexican dollars to the Straits; total, £156,000.

Indian exchange continues easy, the supply of money in Calcutta and Bombay being very good. At the same time there was an excellent demand for Council bills, and of those offered in London were taken at 16d. per rupee. Shipments of silver from London to India have been light.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars.....	$0.41½	$0.43
Peruvian soles and Chilean pesos	.39	.42
Victoria sovereigns.....	4.84	4.88
Twenty francs.....	3.86	4.88
Twenty marks.....	4.76	4.80
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

July	Sterling Exchange	Silver—N. Y. Cts.	Silver—London, Pence.	Copper—Lake, Cts. per lb.	Copper—Electrolytic, Cts. per lb.	Copper—London, £ per ton.	Tin, Cts per lb.	Lead Cts per lb.	Spelter—N. Y. Cts. per lb.	Spelter—St. L., Cts. per lb.
2	4.87½	52⅞	24⅛	13¾ @14	13⅜ @13½	57⅜	28	4.05 @4.10	5.67½	5.50
3	4.87¼	53	24 1/16	13¾ @14	13⅜ @13½	56¼	27¾	4.05 @4.10	5.67½	5.50
4	... ..	.....	24 5/16	.....	.....	.....	.....	.....	.....	.....
6	4.87¼	52⅞	24⅛	13¾ @14	13⅜ @13½	56¼	27¾	4.05 @4.10	5.62½ @5 67½	5.45 @5.50
7	4.87¼	52⅞	24⅛	13¾ @14	13⅜ @13½	56½	27½	4.05 @4.10	5.62½ @5.67½	5.45 @5.50
8	4.87¼	52⅞	24⅛	13¾ @14	13⅜ @13½	57¼	27½ @27⅝	4.05 @4.10	5.62½ @5.67½	5.45 @5.50

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures.

Copper has been fairly active throughout the week, consumers both here and abroad taking more interest in the article. Although transactions have not as yet assumed large proportions, it may fairly be assumed that considerable business will develop at an early date. The ruling quotations are given as 13¾@14c. for Lake; 13⅜@13½c. for electrolytic in ingots, cakes and wirebars; 13⅛@13¼c. for cathodes; 13@13⅛c. for casting copper.

The market for standard copper in London, which closed last week at £56 5s., opened on Monday at £56 5s., advanced on Tuesday to £56 10s., and the closing quotations on Wednesday are cabled as £57 2s. 6d.@£57 5s. for spot; £56 12s. 6d.@£56 15s. for three months.

Refined and manufactured sorts we quote: English tough, £61@£62; best selected, £62@£63; strong sheets, £70@£71; India sheets, £67@£68; yellow metal, 6¼@6⅝d.

Exports and imports of copper at New York, Philadelphia and Baltimore in the week of July 7, and for the year to date were, in long tons:

	Week.	Year.
Exports:		
Austria	....	2,927
Belgium	....	829
France	....	11,698
Germany	486	12,869
Holland	360	19,782
Italy	6	1,452
United Kingdom	230	8,692
Other countries	30	3,254
Total copper	1,112	61,503
Matte	....	211
Imports:		
Copper	500	13,302
Matte	....	984
Ore	....	8,844

Chilean Copper Market.—Messrs. Jackson Brothers report from Valparaiso, Chile, under date of June 1, that recent sales of bar copper amounted to 18,446 quintals. Current quotations were $31.85@$32, Chilean gold, per quintal, cash on shore. Sales of matte amounted to 725 tons, quotations being $13.85, Chilean gold, per quintal, basis of 50 per cent copper. No copper ores have been offered for sale, and quotations are nominal around $1.80, Chilean gold, per quintal, basis of 10 per cent.

Tin has been rather dull and depressed, and transactions have been few and far between. Quotations have consequently suffered a decline from 28c. at the close of last week to 27½@27⅝c. for spot; 27@27¼c. for futures.

The foreign market, which closed last week at £126 15s., opened on Monday at £126 10s., declined on Tuesday at £125 10s., and the closing quotations are cabled on Wednesday as £123 15s.@£123 17s. 6d. for spot; £121 5s.@£121 7s. 6d. for three months.

Exports of tin from the Straits for the half year ending June 30 are reported at 26,610 long tons, against 26,120 tons in the corresponding period in 1902; an increase of 490 tons, or 1.9 per cent, this year.

Lead has been in very good demand, and a large business has been done at full prices. The closing quotations are 4@4.02½c., St. Louis; 4.05@4.10c., New York.

The foreign market is again rather dull, Spanish lead being quoted at £11 6s. 3d.; English lead, £11 8s. 9d.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is firm and fairly active. Quotations are 4.02½c. for both Missouri brands and desilverized lead.

Shipments of lead for the week, as reported by the Merchants' Exchange, were 24,540 pigs.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, under date of June 20, that exchange has gone down 10 points, making it 34.25 pesetas to £1. Local quotation for pig lead on wharf has been 62.50 reales per quintal, which, on current exchange, is equal to £10 3s. 9d. per ton of 2,240 lb., f.o.b. Cartagena. Exports of pig lead for the week were 494,488 kgs. to London and 200,261 kgs. to Marseilles. In addition 299,177 kgs. of soft lead were shipped to Marseilles.

Spelter has been quiet, without any special feature. While there is a falling off in the demand for sheet zinc, owing to the various building strikes, consumption in all other lines is very satisfactory. We quote at the close 5.45@5.50c., St. Louis; 5.62½@5.67½c., New York.

The foreign market is steady, good ordinaries being quoted at £20 5s.; specials at £20 10s.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is steady. Quotations continue 5.50c., East St. Louis, for both prompt and July deliveries.

Shipments of spelter for the week, as reported by the Merchants' Exchange, were 45,750 slabs.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, under date of June 20, that the market has been very quiet, with no change in prices of ore. Exports for the week were 346 tons of blende to Antwerp.

Antimony remains quiet. We quote Cookson's at 7½c.; Hallett's at 6½c.; Hungarian, French, Italian, Japanese and United States at 6¼@6⅝c.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Prices of nickel anodes have been agreed upon as follows: 80 to 82 per cent nickel, 45@50c. per lb.; 82 to 84 per cent, 47@49c.; 85 to 87 per cent, 49@54c.; 90 to 92 per cent, 52@57c.; 95 to 97 per cent nickel, 54@59c. The lowest price, in each case, is for lots of 500 lbs. or over; the highest for lots of 100 lbs. or less.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Quicksilver.—The New York price is unchanged at $47.50 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotations are still $44.50@$46 per flask for domestic orders, and $42@$43 for export. The London price is £8 12s. per flask, with the same quotation asked by second hands.

Minor Metals and Alloys.—Wholesale prices, f.o.b. works, are as follows:

Aluminum.	Per lb.
No. 1 99% ingots	33@37c.
No. 2 90% ingots	31@34c.
Rolled Sheets	4c. up
Alum-bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Chromium, pure (N.Y.)—80c.	
Copper, red oxide	50c.
Ferro-Molyb'um (50%)	$1.25
Ferro-Titanium (10%)	90c.
Ferro-Titanium (20@25% N. Y.)	55c.

	Per lb.
Ferro-Tungsten (37%)	28c.
Magnesium	$2.75
Manganese, pure (N. Y.)	60c.
Mangan'e Cop. (20% Mn)	32c.
Mangan'e Cop. (30% Mn)	38c.
Molybdenum (Best)	$1.82
Phosphorus foreign	45c.
Phosphorus American	70c.
Sodium metal	50c.
Tungsten (Best)	62c.

Variation in prices depends on size of orders, deliveries, etc.

Missouri Zinc Ore Market. July 4.

(From Our Special Correspondent.)

The highest price paid for zinc ore during the week was reported at $40 per ton, a price that is satisfactory to producers generally, although it is not quite as high as the seven-to-one plan so strenuously advocated several years ago by the Missouri and Kansas Zinc Miners' Association. The idea evolved at that time was that the price per ton for zinc ore should be seven times the price per hundred for spelter on the St. Louis market, as quoted weekly in the ENGINEERING AND MINING JOURNAL. On this plan producers would now be receiving a price of $38.50 per ton of 60 per cent zinc, with a few bins selling on a straight bid, equivalent to a basis of $38 per ton. It was then assumed that but one sliding scale was necessary for all grades of ore—an advance or deduction of $1 per ton for each unit of 1 per cent above or below 60 per cent of assay. Within the past year the buyers have adopted an additional sliding scale, in that the basis is lowered $1 per ton for each two units of decrease in assay, besides conforming to the former decrease of $1 per unit below an assay of 60 per cent. Lead continues at $51.50 per ton. A year ago zinc advanced over the preceding week $3, closing at $38, and lead advanced $2, closing at $48 per ton.

Following is the shipment of zinc and lead from each of the various camps of the Joplin District reporting for the week:

	Zinc, lb.	Lead, lb.	Total Value.
Webb City & Carterville	2,033,310	299,540	$43,296
Joplin	1,924,800	325,360	42,065
Galena & Empire	917,680	64,790	17,923
Duenweg	804,180	97,770	17,394
Aurora	712,490	9,880	11,388
Alba & Neck	305,490	.....	5,654
Oronogo	264,560	7,900	5,189
Granby	345,000	33,000	3,875
Zincite	187,580	8,300	3,684
Prosperity	128,650	29,330	3,000
Carthage	126,660	.....	2,342
Cave Springs	66,020	24,960	1,939
Spurgeon & Spring City.	101,490	5,810	1,571
Central City	72,040	.....	1,195
Stotts City	47,980	.....	840
Carl Junction	44,050	.....	793
Badger	14,710	2,900	361
Total sales	8,096,690	909,540	$162,509
27 weeks	252,786,970	29,860,350	$5,119,290

Zinc value for week, $138,990; 27 weeks, $4,309,780. Lead value for week, $23,519; 27 weeks, $809,510.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903.	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	30.15	26.32	4.442	4.075	5.349	4.28
April	29.81	27.77	4.567	4.075	5.550	4.37
May	29.51	29.85	4.325	4.075	5.639	4.47
June	28.34	29.36	4.210	4.075	5.697	4.96
July	....	28.38	....	4.075	....	5.27
August	....	28.28	....	4.075	....	5.44
September	....	26.60	....	4.075	....	5.49
October	....	26.07	....	4.075	....	5.38
November	....	25.68	....	4.075	....	5.18
December	....	25.68	....	4.075	....	4.78
Year	....	26.79	....	4.069	....	4.84

Note.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.: for February, 4.861c.: for March, 5.174c.: for April, 5.375c.: for May, 5.469c.: for June, 5.537c.

Average Prices of Copper.

Month.	New York Electrolytic. 1903.	New York Electrolytic. 1902.	New York Lake. 1903.	New York Lake. 1902.	London Standard. 1903.	London Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.34	56.16
March	14.416	11.882	14.572	12.188	62.85	53.39
April	14.454	11.618	14.642	11.986	61.72	52.79
May	14.435	11.856	14.618	12.226	61.73	54.03
June	13.942	12.110	14.212	12.360	57.30	53.93
July	.....	11.771	.....	11.923	....	53.89
August	.....	11.404	.....	11.649	....	51.96
September	.....	11.480	.....	11.760	....	52.63
October	.....	11.449	.....	11.722	....	52.18
November	.....	11.288	.....	11.533	....	51.06
December	.....	11.430	.....	11.599	....	50.95
Year	.....	11.626	.....	11.887	....	52.46

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1903. London. Pence.	1903. N. Y. Cents.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.
January	21.98	47.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	22.49	48.72	25.00	54.23	27.04	60.63
April	23.38	50.56	24.34	52.72	27.30	59.29
May	24.89	54.11	23.71	51.31	27.43	59.64
June	24.29	52.86	24.17	52.36	27.42	59.57
July	....	....	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.95	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
†American Cement	July 21	.30	$60,000	$620,000
American Cement, extra	July 21	.10	20,000	.....
Camp Bird, Colo.	July 28	.36	295,200	750,300
†Continental Zinc	July 1	.40	8,800	44,000
*Empire State, Idaho	July 15	.05	25,277	1,738,601
Gold King, Colo.	July 20	.03	28,105	459,056
Peerless Oil, Cal.	July 1	.14	12,880	126,400
†Phila. Nat. Gas, com.	Aug. 1	.75	231,406	3,185,425
†Pittsburg Coal, pf.	July 25	1.75	519,771	7,796,565
Pittsburg Oil, Cal.	July 1	.02½	6,000	24,000
Rob Roy Zinc	July 1	.02	277	1,757
Tenn. Copper	July 30	1.25	218,750	218,750
*Thirty-Three Oil, Cal.	July 6	.10	10,000	190,000
Texas & Pacific Coal	July 1	1.50	30,000	2,130,000
†U. S. Steel, com.	Sept. 9	1.00	5,083,025	50,809,577
†U. S. Steel, pf.	Aug. 15	1.75	8,929,919	89,262,829
Utah Con.	July 23	1.50	450,000	1,686,000

* Monthly. † Quarterly.

ASSESSMENTS.

Name of Company.	Location. No.	Delinq.	Sale.	Amt.
Alpha Con.	Nev. 27	June 30	July 21	.05
Annandale	Utah ..	July 15	Aug. 8	.00⅛
Best & Belcher	Nev. ..	July 17	Aug. 7	.15
California	Utah ..	July 9	July 25	.001½
Caledonia	Nev. 54	July 8	July 24	.15
Chicago & Bingham	Utah ..	July 17	Aug. 6	.00¼
Christmas	Utah ..	July 14	Aug. 8	.00½
Con. New York	Nev. 18	July 15	Aug. 5	10
Emerald	Utah ..	July 15	Aug. 8	.00½
Eutonia	Utah ..	July 13	Aug. 3	.00½
Free Silver	Utah ..	July 10	Aug. 10	.00¼
Marina Marsicano	Cal. ..	Aug. 1	.....	.10
Martha Washington	Utah ..	July 28	Aug. 8	.01½
Mohave	Utah ..	July 13	Aug. 3	.01
Seg. Belcher & Midas	Nev. 32	July 29	Aug. 18	.05
Skylark Copper	Utah ..	July 24	Aug. 10	.00½
Stockton	Utah ..	July 10	July 30	.01
Tetro	Utah 26	July 25	Aug. 22	.02
Utah Con.	Nev. ..	July 17	Aug. 7	10

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	July 1. H.	July 1. L.	July 2. H.	July 2. L.	July 3. H.	July 3. L.	July 4.* H.	July 4.* L.	July 6. H.	July 6. L.	July 7. H.	July 7. L.	Sales
Amalgamated c., Mont	100	56⅛	55⅛	55⅝	54⅞	54⅜	53⅞	.....	.....	53¾	52⅞	53⅛	52⅛	85,820
†Anaconda c. Mont.	25	88	86¼	86	84½	85¼	.....	.....	.....	87	84	85	84	1,720
Anaconda Gold, Colo.	5	.16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Belcher, Nev.	3	.....	.....	.46	.....	.....	.....	.....	.....	.....	.....	.....	.....	400
Best & Belcher, Nev.	3	.....	.....	2.25	.....	.....	.....	.....	.....	.....	.....	2.25	.....	200
Brunswick, Cal.	1	.....	.....	.....	.....	.04½	.....	.....	.....	.....	.....	.....	.....	40
Caledonia, Nev.	2½	.....	.....	1.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Chollar, Nev.	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Cal. & Va., g.s. Nev	2½	1 65	.....	1.60	.....	.....	.....	.....	.....	1.55	.....	1.50	.....	800
*Confidence, Nev.	3	.....	.....	1.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	300
Cons. Imperial, Colo.	1	.08	.....	.....	.....	.....	.....	.....	.....	.07½	.....	.....	.....	800
C. K. & N., Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cripple Creek c., Colo.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crown Point, Nev.	3	.26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Daly, Utah	20	.....	.....	.....	.....	2.00	.....	.....	.....	.....	.....	.....	.....	100
El Paso, Colo.	1	.....	.....	.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Elkton g., Colo.	1	.....	.....	.50	.....	.50	.....	.....	.....	.....	.....	.43	.....	1,150
Greene Con., c., Mex.	10	23	22⅛	23⅛	22¼	22¾	22⅜	.....	.....	22⅛	22⅛	22¾	22¼	8,385
Gould & Curry, Nev.	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hale & Norcross	3	.....	.....	.....	.....	.....	.....	.....	.....	.75	.....	.80	.....	200
Isabella, g., Colo.	1	.....	.....	.....	.....	.17	.....	.....	.....	.17	.....	.....	.....	1,000
Jack Pot, Colo.	1	.09½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,000
Justice, Nev.	1	.....	.....	.8	.....	.....	.....	.....	.....	.....	.....	.14	.13	1,000
Leadville, Colo.	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.03	.....	300
Mexican, Nev.	3	1.20	.....	.....	.....	1.30	.....	.....	.....	.....	.....	.....	.....	400
Mollie Gibson, Colo.	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moon-Anchor, Colo.	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.08	.....	1,000
Occidental, Nev.	1	.35	.....	.....	.....	.....	.....	.....	.....	.30	.....	.....	.....	400
Ontario, Utah	130	.....	.....	5.75	.....	.....	.....	.....	.....	5 75	.....	.....	.....	22
Ophir, s., Nev.	1	1.70	.....	.....	.....	1.65	.....	.....	.....	1.65	.....	1 75	.....	700
Pharmacist, Colo.	1	.....	.....	3½	.....	.....	.....	.....	.....	.....	.....	.....	.....	2,000
Phœnix, Ariz.	1	.....	.....	.....	.....	.....	.....	.....	.....	.07	.....	.....	.....	50
Portland, Colo	10	1.35	.....	1.37	1.35	.....	.....	.....	.....	1.35	.....	.....	.....	500
Potosi, Nev.	3	.....	.....	.32	.....	.33	.32	.....	.....	.....	.....	.32	.....	900
Savage, Nev.	2½	.20	.....	.....	.....	.23	.....	.....	.....	.....	.....	.....	.....	400
Silver Hill, Nev.	1	.....	.....	.....	.....	.....	.....	.....	.....	.90	.....	.....	.....	200
Small Hopes, Colo.	20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.32	.....	100
Standard, Cal.	10	3.00	.....	3.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	150
Tenn. c., Tenn.	25	32	29¾	32	31¾	31⅜	31⅜	.....	.....	31¾	.....	31½	30½	16,400
Union Con., Nev.	2½	.....	.....	.....	.....	.90	.....	.....	.....	.....	.....	.....	.....	50
Union Cop., N. C.	10	1⅛	1⅜	.....	.....	.....	.....	.....	.....	1⅜	.....	.....	.....	500
United Copper	100	18⅝	18⅜	18¾	18⅜	18⅝	16⅞	.....	.....	18⅜	.....	18⅝	18⅜	1,110
Vindicator, Colo.	1	.....	.....	.80	.....	.83	.....	.....	.....	.....	.....	.....	.....	400
White Knob, g. s., Ida	100	.....	.....	14¼	14	.....	.....	.....	.....	.....	.....	.....	.....	300
Yellow Jacket, Nev.	2	.80	.....	.....	.....	.....	.....	.....	.....	.80	.....	.....	.....	900

*Holiday. Total sales 136,207 shares.

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	July 1 H.	July 1 L.	July 2. H.	July 2. L.	July 3. H.	July 3. L.	July 4.§ H.	July 4.§ L.	July 6. H.	July 6. L.	July 7. H.	July 7. L.	Sales
Adventure Con., c.	$25	100,000	5	....	5⅛	5	5	.....	.....	.....	5	4½	4⅞	4½	1,465
Allouez	25	59,511	6⅛	.....	6¼	6¾	.....	.....	.....	.....	6	5⅝	.....	.....	415
Amalgamated, c.	100	1,538,879	56⅛	55¼	55⅜	54¼	54⅞	53⅞	.....	.....	53⅜	52⅞	53⅛	52⅜	12,024
Am. Gold Dredging	5	90,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Z. L. & Sm.	25	60,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Anaconda	25	1,200,000	.....	.....	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
Arcadian, c.	25	150,000	2⅜	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	150
Arnold	25	60,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic, c.	25	100,000	.....	.....	9⅞	.....	.....	.....	.....	.....	10	.....	9⅞	.....	165
Bingham Con., g. s.	50	150,000	28	27⅜	.....	.....	27	.....	.....	.....	.....	.....	28¾	28⅜	430
Bonanza	10	300,000	.....	.....	.65	62½	.....	.....	.....	.....	.....	.....	.....	.....	100
Cal. & Hecla, c.	25	100,000	495	485	.....	.....	455	450	.....	.....	.....	.....	460	445	77
Centennial, c.	25	90,000	20	.....	20	19⅛	19	.....	.....	.....	.....	.....	.....	.....	253
Central Oil	25	60,550	7⅜	.....	8⅛	7¼	9⅛	8	.....	.....	9	.....	.....	.....	1,590
Con. Mercur, g.	5	1,000,000	1⅜	1 7/16	1⅛	.....	1⅜	.....	.....	.....	1⅛	1 7/16	1⅛	1⅛	1,945
Copper Range Con.	100	285,000	54¾	54	54⅛	53	54	53¼	.....	.....	53⅛	53	53	52½	2,050
Daly-West., g. s.	20	180,000	43	42¾	43	43	43	.....	.....	.....	43⅜	.....	42⅜	42⅛	537
Dominion Coal.	100	150,000	.....	.....	98⅛	96⅜	100	98½	.....	.....	103⅛	100	106¼	104	5,485
Dominion Coal, pf.	100	30,300	.....	.....	115	.....	.....	.....	.....	.....	115	.....	115	114½	55
Dominion I & S.	100	100,000	18	17⅛	19	18¼	20	18⅜	.....	.....	20⅜	19¼	21¼	20⅝	5,819
Elm River.	12	100,000	3	.....	3	2⅝	3	.....	.....	.....	.....	.....	2¾	.....	370
Franklin, c.	25	100,000	8⅛	8⅛	.....	.....	9	.....	.....	.....	9	8⅝	8⅝	.....	225
Granby	10	1,333,303	4¼	4	4⅛	.....	.....	.....	.....	.....	4¼	.....	.....	.....	865
Guanajuato, Con.	5	385,000	1⅛	1	1⅛	1	.....	.....	.....	.....	.....	.....	1¼	1¼	1,710
Isle Royale Con., c.	25	385,000	.....	.....	.....	.....	7⅛	7⅛	.....	.....	.....	.....	.....	.....	100
Mass Con., c.	25	100,000	6¼	.....	6	.....	6⅛	.....	.....	.....	.....	.....	6	.....	165
Mayflower, c.	25	100,000	.....	.....	1¼	.....	.....	.....	.....	.....	.....	.....	.....	.....	125
Michigan	25	100,000	9	8⅜	.....	.....	8	.....	.....	.....	.....	.....	.....	.....	360
Mohawk, c.	25	100,000	45	.....	45	44⅛	44	.....	.....	.....	.....	.....	44	43¾	430
Mont. Coal & Coke	25	200,000	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	5	.....	200
Mont'l & Boston, c.	5	570,000	1	.....	1⅛	1	1 1/16	1 1/32	.....	.....	.....	.....	.....	.....	955
Nova Scotia St. & C.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	100	.....	100	.....	40
Nova Scotia St. & C. pf	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Old Colony, c.	25	100,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Old Dominion, c.	25	150,000	13¾	.....	13¾	13¼	13¼	13	.....	.....	.....	.....	13⅜	13	535
Osceola, c.	25	96,150	57	56¾	58	.....	56⅜	56⅛	.....	.....	56⅜	.....	.....	.....	136
Parrot, s. c.	10	229,850	21⅛	.....	22	21⅛	21⅜	.....	.....	.....	22	.....	21¾	21	1,159
Phoenix Con., c.	25	100,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quincy, c.	25	100,000	.....	.....	100	.....	100	.....	.....	.....	98	.....	100	98	38
Rhode Island, c.	25	100,000	.....	.....	.....	2⅛	.....	.....	.....	.....	.....	.....	.....	.....	100
Santa Fe, g. c.	10	250,000	1⅛	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Shannon, c.	10	188,153	11⅛	11	11⅜	.....	11	.....	.....	.....	11	.....	11	.....	885
Tamarack, c.	25	60,000	117	.....	.....	.....	.....	.....	.....	.....	.....	.....	105	.....	99
Tennessee	25	175,000	33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Trimountain	25	100,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	87	.....	10
Trinity, c.	25	160,500	5¾	5⅝	5⅞	5⅛	5¾	.....	.....	.....	5⅛	5¼	5⅛	5⅛	1,050
United Copper	100	450,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
United States, g.	25	419,000	23⅜	22¼	22	.....	21⅜	21⅜	.....	.....	.....	.....	21⅛	21	1,051
U. S. Coal & Oil.	25	240,000	11¾	.....	11⅜	.....	11⅛	.....	.....	.....	12	.....	.....	.....	100
Utah Con., g.	5	300,000	28⅜	25	28¾	28⅛	28¾	28½	.....	.....	28⅛	.....	28⅛	28¼	1,621
Victoria, c.	25	100,000	4⅛	4	4¼	4 1/16	4⅜	.....	.....	.....	4	.....	.....	.....	406
Winona, c.	25	100,000	8¾	.....	9	.....	.....	.....	.....	.....	.....	.....	8¾	8½	195
Wolverine, c.	25	60,000	67½	.....	67½	.....	.....	.....	.....	.....	.....	.....	68	.....	218
Wyandot	25	100,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Boston Stock Exchange. †Ex Dividend. ‡Assessment Paid. §Holiday. Total sales, 23,418 shares.

SAN FRANCISCO.*

Name of Company.	Location.	Capitalization.	June 26. H.	June 26. L.	June 27. H.	June 27. L.	June 28. H.	June 28. L.	June 30. H.	June 30. L.	July 1. H.	July 1. L.	July 2. H.	July 2. L.	Sales.
Central Eureka	Cal.	$400,000	.90	.89	.....	.....	.89	.....	.85	.....	.87	.....	.....	.....	3,400
Colehan	Nev.	1,000,000	.22	.19	.....	.....	.....	.....	.....	.....	.22	.21	.....	.....	1,100
Draper	Cal.	500,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Esperanza	Nev.	1,000,000	.....	.....	.05	.....	.06	.04	.06	.05	.06	.05	.....	.....	14,300
Gipsy Queen	Nev.	750,000	.27	.....	.26	.....	.....	.....	.....	.....	.26	.....	.....	.....	1,000
Gold Mtn., Con.	Nev.	750,000	.21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500
Lucky Tom	Nev.	1,000,000	.14	.....	.....	.....	.....	.....	.....	.....	.14	.....	.....	.....	1,600
MacNamara	Nev.	500,000	.....	.....	.....	.....	.....	.....	.....	.....	.27	.....	.....	.....	100
Mont. Tonopah	Nev.	1,000,000	1.05	.....	1.05	.....	1.05	1.00	.....	.....	1.00	.....	.....	.....	3,000
New York Tonopah	Nev.	1,000,000	.10	.09	.....	.....	.....	.....	.12	.11	.15	.....	.....	.....	2,500
Paymaster	Nev.	750,000	.22	.....	.....	.....	.23	.....	.....	.....	.23	.20	.....	.....	1,880
Rescue	Nev.	500,000	.15	.....	.....	.....	.15	.....	.15	.....	.....	.....	.....	.....	1,400
South Eureka	Cal.	300,000	.12	.....	.13	.....	.14	.13	.....	.....	.....	.....	.....	.....	4,439
Tonopah-Belmont	Nev.	2,000,000	2.25	2.20	.....	.....	2.22½	2.15	.....	.....	2.20	2 17½	.....	.....	1,600
Tonopah Fraction	Nev.	750,000	.....	.....	.....	.....	.50	.....	.....	.....	.....	.....	.....	.....	1,000
Tonopah Midway	Nev.	1,000,000	.....	.....	.....	.....	.....	.....	.....	.....	.53	.....	.....	.....	300
Tonopah North Star	Nev.	750,000	.48	.....	.49	.....	.....	.....	.....	.....	.49	.....	.....	.....	500
Tonopah Union	Nev.	750,000	.....	.....	.....	.....	.....	.....	1.40	.....	.....	.....	.....	.....	200
United Tonopah	Nev.	.....	.....	.....	.....	.....	.16	.....	.....	.....	.16	.....	.....	.....	2,500
Utopia	Nev.	1,000,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*San Francisco & Tonopah Mining Exchange. Total sales, 41,299 shares. Board adjourned Wednesday July 1st, till Tuesday, July 7th.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	July 1. H.	July 1. L.	July 2. H.	July 2. L.	July 3. H.	July 3. L.	July 4.* H.	July 4.* L.	July 6. H.	July 6. L.	July 7. H.	July 7. L.	Sales
Allis-Chalmers, U. S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Allis-Chalm's, pf, U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Agr. Chem., U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Agr. Chem. pf, U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Sm. & Ref., U.S.	100	46⅜	45⅞	45⅝	45½	45¼	45	.....	.....	.....	.....	44¼	43⅝	2,610
Am. Sm. & Ref. pf, U.S.	100	93	93	.....	.....	93	93	.....	.....	.....	.....	93	92½	93	93	1,272
Am. Steel & Fdy., U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. S. & Fdy. pf., U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Col. Fuel & I., Colo.	100	64¾	61½	63¼	61⅝	63	62¼	.....	.....	.....	.....	65¼	63¼	64⅜	64	17,600
Col. & H. C. & I., Colo.	100	17¾	17¾	17⅜	.....	.....	.....	.....	.....	.....	.....	17¾	.....	17⅜	17	1,560
†Crucible Steel, U. S.	100	15⅛	15⅛	15	.....	14¾	14¾	.....	.....	.....	.....	.....	.....	14⅜	14½	1,080
†Crucible Steel, pf, U S	100	81	80¾	80⅞	80½	80⅞	80¾	.....	.....	.....	.....	81	80¾	80⅜	.....	357
†Mong. R. Coal, Pa.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10⅝	.....	10⅜	.....	145
†Mong. R. Coal pf, Pa	100	.....	.....	39	.....	.....	.....	.....	.....	.....	.....	.....	.....	39	.....	10
National Lead, U.S.	100	17⅝	17½	17¾	16⅜	17	17	.....	.....	.....	.....	.....	.....	16¾	.....	1,000
National Lead pf, U.S.	100	83¼	.....	83⅜	.....	.....	.....	.....	.....	.....	.....	84	.....	.....	.....	200
†Phila Nat. Gas.	100	42	41½	42⅜	42¼	.....	.....	.....	.....	.....	.....	42½	42⅜	.....	.....	1,038
†Phila Nat. Gas, pf	100	46¾	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
†Pittsburg Coal, Pa.	100	28⅜	.....	28⅛	.....	28½	28¼	.....	.....	.....	.....	.....	.....	28¾	28⅛	1,350
†Pittsburg Coal pf, Pa	100	86⅞	86¼	87	86⅝	87	86⅞	.....	.....	.....	.....	86⅞	.....	87	86⅞	737
Republic I. & S., U.S.	100	14⅞	.....	15	14¼	14⅜	.....	.....	.....	.....	.....	.....	.....	14⅜	14⅛	1,600
Republic I. & S., pf, U.S.	100	74½	74	.....	.....	74½	.....	.....	.....	.....	.....	74¾	.....	.....	.....	357
Sloss-Shef S. & I., Ala.	100	40½	40	.....	.....	40	.....	.....	.....	.....	.....	40½	40	40½	.....	720
Sloss-Shef S. & I. pf, Ala.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard Oil, U.S.	100	646	.....	.....	.....	.....	.....	.....	.....	.....	.....	650½	648	650	649½	119
Tenn. C. I. & R. R., Ala.	100	53½	52	52¾	51	51⅛	50	.....	.....	.....	.....	53¼	52⅛	53	52¾	7,425
U. S. Red & Ref., U. S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
U.S. Red & R. pf., U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
U.S. Steel Corp., U.S.	100	31¾	31½	31⅛	30½	30⅞	30¼	.....	.....	.....	.....	30⅜	30⅜	30⅝	29½	67,745
U.S. Steel Corp. pf, U.S.	100	82⅛	81½	81⅜	81	81⅜	80⅝	.....	.....	.....	.....	81⅜	81⅛	81⅞	80⅜	30,155
Va.-Car Chem., U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	54	.....	200
Va.-Car Chem. pf, U.S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	115¼	115	200
Va. I. C. & Coke, U. S.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*New York Stock Exchange. †Pittsburg Stock Exchange. ‡Ex-Dividend. Total sales, 137,645 shares. *Holiday

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	June 27. H.	June 27. L.	June 29. H.	June 29. L.	June 30. H.	June 30. L.	July 1. H.	July 1. L.	July 2. H.	July 2. L.	July 3. H.	July 3. L.	Sales
Acacia	$1	.08⅜	.08	.08⅜	.07½	.08¼	.08	.08⅛	.08	.08	.07½	.07⅞	.07⅜	8,000
Am. Con.	1	.....	.....	.....	.....	.....	.....	.02⅜	.....	.....	.....	.02	.....	.....
Anaconda	1	.14½	.12½	.12¼	.12⅜	.12⅛	.12	.13	.12⅛	.12⅜	.....	.12⅛	.....	.....
Ben Hur	1	.02¼	.01⅞	.01⅞	.....	.01⅞	.....	.01⅞	.....	.01⅞	.....	.01⅞	.....	.....
Blue Bell	1	.06	.05½	.05	.....	.05	.....	.07	.05	.05	.....	.05	.....	.....
C. C. & M.	1	.02¼	.02	.03	.02	.02⅛	.....	.02⅛	.....	.02⅜	.02⅛	.02⅛	.02⅛	.....
C. K. & N.	1	21¼	.21	.21	.20⅜	.21	.20⅞	.21¼	.21	.21½	.21	.21⅜	.21	37,500
C. C. Con.	1	.04½	.....	.05	.04¾	.04½	.....	.04	.....	.04	.....	.04⅞	.04	.....
Coriolanus	1	.03	.02	.03	.....	.03	.....	.03	.....	.02¼	.....	.02½	.01½	.....
Des Moines	1	.04	.02⅛	.02½	.....	.02⅛	.....	.02½	.....	.03⅛	.02¼	.03⅛	.....	.....
Dr. Jack Pot	1	.08	.08	.09	.08¾	.09	.08¾	.09	.08¼	.09	.08¾	.09	.08¾	5,500
Elkton Con.	1	.41	.....	.41	.....	.41	.....	.41¼	.....	.41½	.....	.43	.41¼	1,800
El Paso	1	.60½	.60	.61½	.60	.61½	.61	.63	.61	.62	.61	.62	.60¾	3,000
Fannie Rawlings	1	.03⅜	.....	.03⅜	.....	.03⅜	.....	.03⅜	.....	.03⅜	.....	.03⅜	.....	.....
Findley	1	.14¼	.14	.14¼	.14	.14¼	.14	.14¼	.13⅜	.14¼	.13⅜	.14¼	.13	7,000
Gold B nd	1	.03	.02¼	.03	.02½	.02⅜	.02½	.03	.02¼	.02⅜	.02⅛	.02½	.02⅛	2,000
Gold Dollar Con.	1	.05	.04⅞	.05	.04⅞	.05	.04⅞	.05	.04⅞	.05	.04⅞	.05	.04¾	15,000
Golden Cycle	1	.....	.....	.69	.66	.69	.66	.69	.66¾	.70	.68	.70	.68	3,000
Golden Fleece	1	.12	.....	.11	.05	.11	.05	.12	.06	.11	.07	.11	.05	.....
Gould	1	.03⅛	.03	.03¼	.03	.03⅛	.02⅝	.03⅛	.03	.03⅛	.03	.03¼	.03	3,000
Hart	1	.05	.02½	.05	.02½	.05	.....	.05	.02½	.05	.02½	.03	.02½	.....
Isabella	1	.15	.14¾	.15¼	.14⅞	.15⅛	.14¾	.15¼	.14¾	.15¼	.15	.15⅜	.15	3,600
Jack Pot	1	.09	.....	.09	.....	.09	.....	.09	.....	.09	.....	.09	.....	.....
Last Dollar	1	.55	.50	.55	.49	.55	.49	.55	.49	.55	.49	.55	.49	.....
Lexington	1	.04¾	.03⅞	.04½	.03⅞	.03⅜	.03⅝	.04¼	.03⅝	.04¼	.03⅝	.04¼	.03⅝	3,000
Little Puck	1	.03	.....	.02	.....	.03	.02½	.03	.02	.03	.02	.....	.....	.....
Mollie Gibson	1	.06	.05½	.06	.05½	.06	.05½	.05½	.....	.06	.05½	.06	.....	2,000
Moon Anchor	1	.08¼	.08	.09	.08	.09	.08	.09	.....	.08½	.08	.09	.08	.....
New Haven	1	.02¾	.02½	.03	.02½	.03	.02½	.03	.02¾	.02¾	.02½	.02¾	.02⅝	1,000
Pharmacist	1	.04	.....	.03¾	.03⅜	.03¾	.03⅜	.03¾	.03	.03¾	.03½	.03⅝	.....	2,000
Pinnacle	1	.04¼	.....	.04¼	.....	.04¼	.....	.04	.....	.04¼	.....	.04¼	.....	.....
Pointer	1	.01	.....	.....	.....	.01	.....	.....	.....	.01	.....	.01	.....	.....
Portland	1	1.32	1.25	1.30	1.26	1.32	1.27	1.32	1.26	1.32	1.26	1.32	1.26	3,000
Prince Albert	1	.03	.02	.02	.....	.02½	.02	.02¼	.02	.02	.....	.02	.....	3,000
Vindicator	1	.91	.....	.91	.....	.91	.....	.91	.....	.91	.....	.91	.....	.....
Work	1	.06	.05¼	.05⅜	.....	.05⅜	.05¼	.05¼	.....	.06¾	.05¼	.05¼	.....	1,000

*Colo. Springs Mining Stock Exchange. † Holiday. All mines are in Colorado. Total sales 104,400 shares.

COLORADO SPRINGS. (*By Telegraph.*)

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STOCK QUOTATIONS

MEXICO*. June 26.

Name of Company	Share Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Durango.				
Ca. Min. de Penoles	2,500	$50.00	$4,100	$4,800
San Andres de la Sierra	200	.....	10,000	.....
Guanajuato.				
Angustias, Pozos	2,400	5.00	85	90
Cinco Senores y An., aviadoras	2,000	15.00	190	195
Cinco Senores y An., aviada	400	10.00	160	170
Providencia, San Juan de la Luz	6,000	2.00	150	160
Queensland y Australia	300	.....	85	95
Guerrero.				
Delfina, 1st serie	2,500	.....	45	40
Delfina, 2d serie	2,500	.....	30	29
Garduno y Anexas	7,200	.....	45	60
Hidalgo.				
Amistad y Concordia	9,600	6.90	84	86
Carmen, aviada	1,100	.....	140	150
Guadalupe Fresnillo Mill	1,000	.....	230	270
Guadalupe Fresnillo Mine	1,400	.....	70	80
La Blanca, aviadora	1,536	.....	1,080	1,120
La Blanca, aviada	768	.....	825	840
La Reina y An., aviadora	5,000	.....	21	22
Luz de Maravillas, aviadas	1,100	.....	20	.....
Maravillas y An., aviador	1,680	.....	90	110
Maravillas el Lobo	1,000	.....	130	180
Palma y An., aviador	1,800	.....	.....	12
Real del Monte	2,554	10.00	.....	.....
Refugio, avadia	12,800	.....	7	8
Santa Ana y An., aviadora	1,800	.....	30	40
Santa Ana y An., aviada	600	.....	25	30
Sta. Gertrudis y An., aviadas	9,600	.....	8	10
Sta. Gertrudis y An., aviadora	28,800	1.00	88	89
Santo Tomas Apostol aviadoras	5,100	.....	3	6
San Felipe de Jesus, aviadora	3,600	.....	18	20
San Felipe de Jesus, aviada	1,200	.....	.....	10
San Rafael y An., Trompillo	1,200	12.00	1,215	1,250
San Rafael y An., aviada	1,200	4.00	460	470
Soledad, aviada	900	0 .00	445	465
Sorpresa, aviada	900	5.00	330	335
.....	.....	.....	.....	.....

Name of Company.	Shares Issued.	Last div'd	Prices. Bid.	Prices. Ask.
Mexico.				
Alacran	$2,400	.....	60	70
Aldebarran	.....	.....	98	105
Buen Despacho	3,000	.....	80	83
Dos Estrellas	3,000	30.00	2,380	2,380
La Esperanza (El Oro)	3,000	10.00	1,480	1,500
La Reformia, aviadores	2,000	.....	82	90
Providencia, pagadoras	1,800	.....	.....	.....
Providencia, liberadas	900	.....	40	42
Santa Ana, Esperanza	2,400	.....	70	90
Michoacan.				
Luz de Borda, aviadora	3,000	.....	98	100
Luz de Borda, aviada	1,000	.....	23	26
Nerevo Leon:				
La Fraternal	1,000	.....	600	550
Norias de Bajan	1,000	.....	700	800
Santiago y An., Tlal.	4,000	.....	.....	.....
San Luis Potosi.				
Concepcion y An	3,000	.....	90	100
El Barreno, aviadora	2,000	2.00	40	45
Sta. Maria de la Paz	2,400	20.00	720	725
San Diego y Annexas.	2,400	4.00	25	28
Zacatecas.				
Asturiana y An	2,500	.....	55	65
Candelaria y Pinos	2,500	10.00	280	300
Cubiertas	2,400	.....	.....	.....
Esperanza y An	2,400	.....	55	65
Lourdes	2,500	.....	50	60
Luz de Minillas, pagadoras	2,000	.....	10	15
Nueva Quebradilla, aviadoras	2,400	.....	90	100
Nueva Quebradilla, aviadas	600	.....	45	40
San Carlos y Annexas	2,500	20.00	130	150
Sta. Maria de Gaud.	2,500	10.00	75	80
Miscellaneous.				
Bartolome de Medina	2,000	1.50	70	73
Guadalupe Hacienda	10,000	6.00	.....	.....
La Luz Hac. (Pachuca)	3,750	.....	280	290
La Reina (Chihuahua)	192	.....	.....	.....
Naica (Chihuahua)	100	.....	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	10.00	1,000	1,100
Natividad (Oaxaca) aviadas	600	4.00	1,000	1,100
San Francisco Hac	6,000	1.00	53	55
Santa Ana Huantla Morelos	4,000	.....	.....	.....
Union Hacienda	3,000	5.00	225	240

*Values are in Mexican currency.

SALT LAKE CITY.* July 4.

Name of Company	Shares.	Par Val	High	Low	Sales.
Ajax	300,000	$10	24½	.24	1,300
Ben Butler	500,000	1	.12¾	.11½	2,223
California	300,000	1	.15½	.13½	8,500
Carisa	500,000	1	.11	.10	9,169
Con. Mercur	1,000,000	5	1.46	1.45	3,900
Century	.....	.....	.54½	.54	200
Daly-Judge	300,000	1	10.85	10.75	450
Daly-West	300,000	20	43.25	42.00	555
Grand Central	250,000	1	4.52	4.50	300
L. Mammoth	150,000	1	.77¾	.68¼	18,400
M. Washington	300,000	.....	.02	.01½	7,000
Mammoth	400,000	25	.....	.....	.....

Name of Company.	Shares.	Par Val	High	Low	Sales.
Majestic Cop	.....	.....	.....	.....	.....
May Day	400,000	0.25	.19¼	.18	8,500
N. Y. Bonanza	.....	.....	.24¾	.22	4,100
Petro	.....	.....	.....	.....	.....
Sacramento	1,000,000	5	.24½	.22½	15,500
Silver Shield	.....	.....	.....	.....	.....
South Swansea	300,000	1	.17	.17	500
Star Con	500,000	1	.32½	.23	24,700
Uncle Sam	500,000	1	.22½	.20	1,580
Utah	100,000	10	.63	.62	900
Victor	500,000	1	.19½	.18¾	9,900
Wabash	.....	.....	.23⅜	.22½	7,500
Yankee Con	500,000	1	.34	.33⅛	400

All mines are in Utah. *By our Special Correspondent. Total sales, 125,508 shares.

ST. LOUIS, MO June 27.

Name.	Capital Stock	Par val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo	$3,000,000	$10	$0.50	$0.75
Catherine Lead, Mo.	500,000	10	1.25	2.25
Central Coal & C	1,875,000	100	63.25	65.00
Central C. & C., pf.	1,875,000	100	74.00	75.50
Central Lead, Mo.	1,000,000	10	100.00	425.00

Name.	Capital Stock.	Par val.	Prices. Bid.	Prices. Ask.
Columbia Lead, Mo.	$500,000	10	$11.00	15.00
Con. Coal, Ill.	500,000	100	22.50	23.00
Doe Run Lead Co.	1,500,000	100	107.50	110.00
Granite Bimet, Mt.	1,000,000	10	.60	.68
St. Joe Lead, Mo.	6,000,000	10	15.50	17.00

* From Our Special Correspondent.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	July 1. H.	July 1. L.	July 2. H.	July 2. L.	July 3. H.	July 3. L.	July 4.* H.	July 4.* L.	July 6. H.	July 6. L.	July 7. H.	July 7. L.	Sales
Am. Alkali, Mich	$50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Cement	10	8	8	.....	.....	.....	.....	.....	.....	.....	.....	8	8	511
Cambria Iron, Pa	50	.....	.....	.....	.....	47	47	.....	.....	.....	.....	47	46¾	213
Cambria Steel, Pa	50	23¾	23½	23¾	23¾	24	23¾	.....	.....	24½	23¾	24½	23⅞	4,060
Penn. Steel, pfd.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Susq. I. & S., Pa.	5	1⅛	1⅛	1⅛	1⅛	1⅛	1 7/8	.....	.....	.....	.....	.....	.....	5,440
United Gas I., Pa.	50	89	88½	89	89	89	89	.....	.....	89¼	89	89¼	89	944
Warwick I. & Steel	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4¾	4¾	15

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 11,183 shares.

LONDON. June 26.

Name and Country of Company	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Latest dividend. Date	Quotations. Buyers. £. s. d.	Quotations. Sellers. £. s. d.
Alaska-Treadwell, g., Alaska	200,000	5 0 0	3 0	Apr., 1903	4 12 6	4 17 6
Anaconda, c. s., Montana	1,200,000	5 0 0	2 0	May, 1903	4 6 3	4 8 9
Arizona, c., Def., ord	63,444	1 0 0	6 6	Feb., 1903	7 15 0	8 5 0
Arizona, pref., ord	316,350	1 0 0	5 6	Feb., 1903	8 0 0	8 5 0
Camp Bird, g., Colorado	738,000	1 0 0	1 6	July, 1903	1 8 9	1 11 3
Central Chile, c., Chile	276,248	1 0 0	.....	.....	..... 3 0	..... 4 0
Copiapo, c., Chile	112,500	2 0 0	6 10	May, 1903	1 17 6	2 2 6
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	..... 10 0	..... 12 6
El Oro, g., Mexico	1,000,000	1 0 0	1 6	Dec., 1902	1 13 9	1 16 3
Frontino & Bolivia, g., Colombia	128,862	1 0 0	3 0	July, 1901	..... 15 0	..... 17 6
Le Roi, g., British Col	200,000	5 0 0	5 0	Nov., 1899	1 2 6	1 5 0
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	1 5 0	1 7 6
Mesquital, Mexico	250,000	..... 2 0	 3	Feb., 1903	..... 2 6	..... 3 6
Montana, g. s., Montana	657,128	1 0 0	6	April, 1899	..... 1 9	..... 2 3
Mountain, c., Cal.	250,000	5 0 0	4 0	Nov., 1902	3 2 6	3 7 6
Stratton's Independence, Colorado	1,000,007	1 0 0	6	April, 1902	..... 8 6	..... 9 6
*St. John del Rey., g., Brazil	546,265	1 0 0	8	June, 1903	..... 15 0	..... 16 0
Utah Con., g. c., (Highland Boy), Utah	300,000	1 0 0	7 0	Jan., 1903	5 10 0	6 0 0
Ymir, g., British Col	200,000	1 0 0	1 0	Mar., 1902	..... 6 3	..... 8 9
European:						
Linares, l., Spain	15,000	3 0 0	9	Oct., 1902	2 0 0	2 10 0
Mason & Barry, c., sul., Port'g'l	185,172	1 0 0	11 0	May, 1903	3 7 6	3 12 6
Rio Tinto, c., Spain	325,000	5 0 0	27 6	Apr., 1903	46 12 6	46 17 6
Rio Tinto, pref., Spain	325,000	5 0 0	2 6	Apr., 1903	6 0 0	6 5 0
Tharsis, c., Spain	625,000	2 0 0	6 0	May, 1903	3 17 6	4 2 6
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	495,388	1 0 0	2 0	July, 1903	1 16 3	1 18 9
Briseis, Tin, Tasmania	600,000	1 0 0	.....	.....	..... 4 6	..... 5 6
Broken Hill Pr'p., s., N. S. Wales	980,000	..... 8 0	1 0	Feb., 1903	1 7 6	1 8 6
Cosmopolitan Prop., W. Australia	385,000	1 0 0	6	July, 1902	..... 17 6	..... 18 6
Golden Horse Shoe, W. Australia	300,000	5 0 0	6 0	Apr., 1903	8 15 0	9 0 0
Great Fingall Con., W. Australia	250,000	1 0 0	5 0	Sept., 1902	7 16 3	7 18 9
Great Bo'd'r Pr'p., W. Australia	1,750,000	..... 2 0	 6	June, 1903	1 4 0	1 4 3
Ivanhoe Gold Corp. W. Australia	200,000	5 0 0	4 0	Jan., 1903	8 15 0	8 17 6
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	July, 1903	4 10 0	4 12 6
Lake View Cons., g., W. Australia	250,000	1 0 0	rts.	Aug., 1902	2 5 0	2 7 6
Mt. Lyell M. & R. I., c., Tasmania	275,000	3 0 0	1 0	July, 1903	2 18 9	3 1 3
*Mt. Morgan, g., Queensland	1,000,000	1 0 0	 3	May, 1903	3 6 3	3 7 6
Waihi, g., New Zealand	497,412	1 0 0	2 6	June, 1903	5 2 6	5 5 0
Indian:						
Champion Reef, g., Colar Fields	473,000	..... 10 0	4 6	May., 1903	7 6 3	7 8 9
Mysore Gold, Colar Fields	566,043	..... 10 0	4 0	July, 1903	7 1 3	7 3 9
Nundydroog, g., Colar Fields	484,000	..... 10 0	1 6	Mar., 1903	2 10 0	1 12 6
Ooregum, g., Colar Fields	343,000	..... 10 0	1 6	Apr., 1903	1 10 0	1 13 9
Ooregum, pref., g., Colar Fields	240,000	..... 10 0	1 6	Apr., 1903	2 0 0	2 2 6
African:						
Angelo, g, Transvaal	600,000	1 0 0	6 0	July, 1903	7 2 6	7 7 6
Bonanza, g., Transvaal	200,000	1 0 0	10 0	June, 1903	4 0 0	4 2 6
British South Africa	4,436,019	1 0 0	rts.	May, 1899	2 16 3	2 18 9
Cape Copper, S. Africa	300,000	2 0 0	1 0	June, 1903	2 10 0	2 12 6
Cape Copper, pref., S. Africa	75,000	2 0 0	1 0	June, 1903	2 12 6	2 17 6
City and Sub'n (New), g., Transvaal	340,000	4 0 0	8 0	Aug., 1899	6 10 0	6 12 6
Crown Reef, g., Transvaal	120,000	1 0 0	4 0	June, 1903	17 0 0	17 10 0
De Beers Con., d., pref., Cape Colony	800,600	2 10 0	10 0	July, 1903	19 7 3	19 10 0
De Beers Con., def.	1,000,000	2 10 0	15 0	Mar., 1903	20 2 6	20 5 0
East Rand, Prop, Transvaal	970,000	1 0 0	5 0	June, 1903	7 10 0	7 11 3
Ferreira g., Transvaal	90,000	1 0 0	15 0	June, 1903	21 0 0	21 10 0
Geldenhuis Est., g., Transvaal	200,000	1 0 0	6 0	June, 1903	6 7 6	6 10 0
Geduld, g, Transvaal	400,000	1 0 0	rts.	Mar., 1902	6 17 6	6 18 9
Henry Nourse, g., Transvaal	125,000	1 0 0	8 0	Feb., 1903	9 2 6	9 7 6
Jagersfontein, d., Orange F. S.	200,000	5 0 0	6 0	Nov., 1899	29 12 6	29 17 6
Jubilee, g., Transvaal	50,000	1 0 0	5 0	June, 1903	5 5 0	5 10 0
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	3 12 6	3 17 6
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Sept., 1899	4 1 3	4 3 9
May Con., g., Transvaal	288,750	1 0 0	3 0	July, 1903	4 3 9	4 6 3
Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Feb., 1903	5 7 6	5 12 6
Modderfontein, g., Transvaal	290,000	1 0 0	rts.	Apr., 1902	10 2 6	10 5 0
Namaqua, c., Cape Colony	94,331	2 0 0	2 0	June, 1902	2 17 6	3 2 6
Primrose (New), g., Transvaal	325,000	1 0 0	2 0	Feb., 1903	3 15 0	3 17 6
Rand Mines, g., S. Africa	1,795,956	..... 5 0	4 0	June, 1902	10 6 3	10 8 9
Robinson, g., Transvaal	750,000	5 0 0	5 6	Aug., 1903	10 7 6	10 12 6
Robinson Deep, g., Transvaal	950,000	1 0 0	5 0	May, 1899	4 13 9	4 16 3
Rose Deep, Transvaal	425,000	1 0 0	2 0	Feb, 1903	8 15 0	9 0 0
Salisbury, g., Transvaal	100,000	1 0 0	2 0	Mar., 1899	2 7 5	2 12 6
Sheba, g., Transvaal	1,075,000	1 0 0	 6	July, 1898	..... 19 6	1 0 6
Village Main Reef, Transvaal	400,000	1 0 0	5 0	Oct., 1902	8 7 6	8 12 6
Wemmer, Transvaal	80,000	1 0 0	5 0	May, 1903	12 5 0	12 10 0

c.—Copper. d.—Diamonds. g.—Gold l.—Lead. s.—Silver. *Ex-Dividend.

LONDON. (*By Cable*).*

Name of Company.	June 30. £. s. d.	July 7. £. s. d.	Name of Company	June 30. £. s. d.	July 7. £. s. d.
Anaconda	4 5 0	4 5 0	Jagersfontein	30 0 0	29 10 0
British South Africa	2 15 0	2 16 3	Johannesburg Invest	3 2 6	3 1 3
Camp Bird	1 10 0	1 10 0	Modderfontein	10 6 3	9 16 3
Con. Gold-Fields	7 5 0	7 0 0	Rand Mines	10 13 9	10 6 3
De Beers Con. def	20 10 0	20 3 9	Rio Tinto com	47 12 6	46 12 6
East Rand	7 13 9	7 6 3	Simmer & Jack	1 10 0	1 8 9
El Oro, Mex	1 15 0	1 13 9	Tomboy	1 18 9	1 17 0

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. June 25.

Name of Company.	Country.	Product.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Close. Fr.
Boleo	Lower Cal.	Copper	.....	500	176.00	1,380.00	1,361.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	18.50	19.75
Fraser River	Brit. Col'mb.	Gold	250,000	25	.....	6.50	6.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	92.75	93.75
Laurium	Greece	Zinc, Lead	16,300,000	500	25.00	341.00	339.00
Metaux, Cie. Fran. de	France	Metal dealers	25,000,000	500	22.50	473.00	467.00
Nickel	N. Caled'nia	Nickel	15,000,000	250	22.50	484.00	461.00
Sedalia & California	Calif., U. S.	Oil	1,000,000	1	.....	7.75	8.25
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	663.00	654.00

TORONTO, ONT.* June 30.

Name of Company.	par val	Prices. High.	Prices. Low.	Sales.	Name of Company	Par val	Prices. High.	Prices. Low.	Sales.
Black Tail	$1	.04½	.02	.....	Granby Smelter	$10	490	469	.....
Cariboo (Mc. K.)	1	.14	.11	.....	Mountain Lion	1	.28	.20	.....
Cariboo (Hyd.)	1	.75	.....	.....	North Star	1	.14	.11	.....
Center Star	1	.30	.27	.....	Nova Scotia Steel, com	100	.98	.96	.....
Crows Nest, C	100	400	300	.....	Payne	1	.18	.15	.....
Dominion Coal, com	100	.98	.95½	.....	Rambler Cariboo	1	.40	.....	.....
Dominion S. & I.	100	.18¾	.16½	.....	Republic	1	.04	.02	.....
Dominion S. & I., pref.	100	.....	.....	.....	St. Eugene	1	.45	.35	.....
Fairview	1	.06	.04½	.....	Virtue	1	.07	.05	.....
Giant	1	.04	.03	2,500	War Eagle Con	1	.15	.12	2,000

*Standard Stock and Mining Exchange. Total sales 4,500 shares.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHCLESALE PRICES.

(See also Market Reviews.)

	Cust.Meas.	Price.
ABRASIVES—		
Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont. car-lots, f.o.b., Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, Turkish flour in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Naxos flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Chester flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg.ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h. gr.	"	26.00
Garnet, as per quality	sh.ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01⅝@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.40
Bottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.80
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.08
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"	.06
ALCOHOL—Grain	gal.	2.39@2.40
Refined wood 95@97%	"	.60@.65
Purified	"	1.20@1.50
ALUM—Lump	100 lbs.	1.75
Ground	"	1.85
Porous	"	.95
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08¼
Muriate	"	.05⅝
Lump	"	.09
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05⅝@.07¼
Oxide, com'l white, 95%	"	.09½
Com'l white, 95%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White powd.	"	.02⅞@.03
Red		.06¾@.06½
ASPHALTUM—		
Ventura, Cal.	sh.ton	32.00
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh. ton	35.00
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	sh. ton	21.00
Gilsonite, Utah, ordinary	lb.	.03
Select	"	.03¾
BARIUM—		
Carb. Lump, 80@90%	sh.ton	25.00@27.50
92@98%	"	28.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100lbs.	1.67½@1.76
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05¾
BARIUM	Cust.Meas.	Price.
Sulphate (Blanc Fixe)	lb.	$0.01⅝
BARYTES—		
Am. Crude, No. 1	sh.ton	9.00
Crude, No. 2	"	8.00
Crude, No. 3	"	7.75
Floated	"	18.50
Foreign, gray	"	13.50
Snow white	"	17.00
Floated	"	19.00
BAUXITE—Ga. or Ala. Mines:		
First Grade	lg.ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02¼@.02½
BORAX	"	.07¼@.07½
BROMINE—Bulk.	"	.40@.48
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.40
" brown	"	.95
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh.ton	70.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	2.00@2.15
Foreign	"	1.95@2.50
"Rosendale," 300 lbs	"	.80
Slag cement, imported	"	1.65
CERESINE—		
Orange and Yellow	lb.	.13
White	"	.14
CHALK—Lump, bulk	sh.ton	3.25
Ppt. per quality	lb.	.04¼@.05¼
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg.ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg.ton	8.25
Am. best, ex-dock, N. Y.	"	9.25
English, common	"	10.50
Best grade	"	16.25
Fire Clay, ordinary	sh.ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.50@2.65
Gray	"	2.52@2.75
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—in bulk	100 lbs.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25 lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for ultro, (32-2-10° Be.)	"	.13¼@.13⅞
FELDSPAR—Ground	sh.ton	8.00@9.00
FLINT PEBBLES—Dan. Best.	lg.ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Am. lump, 1st grade	sh.ton	14.40
2d grade	"	13.90
Gravel and crushed, 1st gr	"	13.40
2d grade	"	12.40
Ground, 1st grade	"	17.90
Ground, 2d grade	"	16.50
Foreign, lump	"	8.00@12.00
Ground	"	11.50@14.00
FULLER'S EARTH—	100 lbs.	.80
GRAPHITE—Am. f.o.b. Providence, R. I., lump	sh.ton	$8.00
Pulverized	"	30.00
Am., pulverized other than R. I., f.o.b. N. Y.	"	45.00
Best flake	"	150.00
German, com. pulv.	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv.	"	.02¾@.03½
Best pulverized	"	.04@.08
Italian, pulv	"	.01¼
GYPSUM—Ground	sh.ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg.ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—Gr'd.		
American best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lbs.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01¼
True	"	.04
Oxide, pure copperas color.	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	"	.08¼@.08½
Brown	"	.06¼@.06½
Nitrate, com'l	"	.06½
" gran.	"	.08¼
LIME—Com., abt. 250 lbs.	bbl.	.75
Finishing	"	.95
MAGNESITE—Greece.		
Crude (95%)	lg. ton	5.50@6.00
Calcined	sh.ton	15.50
Bricks best imp., f.o.b., N.Y.	M.	155.00
" domes., per qual., f.o.b. Pittsburg	"	160.@200.
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—Powdered,		
70@75% binoxide	lb.	.01¼@.01½
Crude pow'd.		
75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore, 50%, Foreign	unit	.18@.19
Domestic	"	.20
MARBLE—Flour	sh.ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse	sh.ton	33.00@38.00
Fine	lb.	.00⅞@.02
Sheets, N. C., 2x4 in.	"	.30
3x3 in.	"	.80
3x4 in.	"	1.50
4x4 in.	"	2.00
6x6 in.	"	3.00
MINERAL WOOL—		
Slag, ordinary	sh.ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr.:		
25@30, cold test	gal.	.18@.18½
15, cold test	"	.18½@.14
Zero	"	.18@.18½
Summer	"	.12½@.13
Cylinder, dark steam ref.	"	.14½@.15
Dark, filtered	"	.18½@.19
Light, filtered	"	.20½@.20
Extra cold test	"	.25@.31
Gasoline, 86°@90°	"	.16@.21
Naphtha, crude, 68°@72°	bbl.	11.20
"Stove"	gal.	.14½
Linseed, domestic raw	"	.37@.40
Boiled	"	.44
Calcutta, raw	"	.75
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.08
Pure	"	.16
Yellow, common	"	.10¼
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05⅝@.06
English flake	"	.08¼@.08½
Glassmakers'	"	.06½@.08¼
PAINTS AND COLORS—	Cust.Meas.	Price.
Metallic, brown	sh.ton	$19.00
Red	"	16.00
Ocher, Am. common	"	9.25@10.00
Best	"	21.25@25.00
Dutch, washed	lb.	.04¾
French, washed	"	.01½@.01⅞
Orange mineral, Am.	"	.08½@.08⅝
Foreign, as to make	"	.08½@.10¼
Paris green, pure, bulk	"	.13
Red lead, American	"	.06¼@.06½
Foreign	"	.06⅝@.08
Turpentine, spirits	gal.	.49½ @.50
White lead, Am., dry	lb.	.05½@.05⅝
American, in oil	"	.07@.09
Foreign, in oil	"	.07@.07¼
Zinc, white, Am., ex dry	"	.04⅝@.04⅞
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
POTASH		
Caustic, ordinary	"	.04½@.04⅞
Elect. (90%)	"	.06¼
POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran.	"	.14
Bichromate, Am.	"	.08½@.08¾
Scotch	"	.08½@.09
Bromide	"	.25@.38
Carbonate (80@85%)	"	.03½@.04⅝
Chlorate, powd.	"	.07¼@.07⅝
Crystals	"	.07@.07½
Chromate	"	.35
Cyanide (98@99%)	"	.20
Kainit	lg.ton	9.30
Manure salt, 20%	100 lbs.	.06
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09½@.09⅝
Prussiate, yellow	"	.13¼@.13½
Red	"	.34
Sulphate, 90%	100 lbs.	2.11
96%	"	2.14
Sylvanit	unit	.41
QUARTZ—(See Silica).		
SALT—N. Y. com. fine 280 lbs	bbl.	.72@1.18
N. Y. agricultural	sh.ton	4.40
SALTPETRE—Crude	100 lbs.	3.20@3.35
Refined	"	4.00@4.50
SILICA—Best foreign	lg.ton	10.00@11.00
Ground quartz, ord.	sh.ton	6.00@8.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.33½
Oxide	"	.85@1.10
SODIUM—		
Bicarb., ordinary, f.o.b. w'ks	100 lbs.	1.25
Extra domes. f.o.b. w'ks	"	3.50
Foreign, f.o.b. N. Y.	"	1.60
Bichromate	lb.	.06¼
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.75@.82½
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 60@78%, f.o.b. w'ks	"	1.65@1.70
Foreign, f.o.b. N. Y.	"	1.90@2.00
Chlorate, com'l	"	.07¼@.07⅝
Hyposulphite, Am.	"	1.60@1.65
German	"	1.70@1.90
Nitrate, spot	"	2.00
Shipments	"	1.97½@2.00
Peroxide	lb.	.45
Phosphate	"	.02½@.02¼
Prussiate	"	.09¾
Sal soda, f.o.b. works	100 lbs.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, conc.	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lbs.	.82½
Sulphide	lb.	.01¼
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.15
TALC—N. C., 1st grade	sh.ton	18.00
N. Y., Fibrous, best	"	10.20
French, best	100 lbs.	2.00
Italian, best	"	2.37½
TAR—Regular	bbl.	2.40
Oil barrels	"	4.40
TIN—Crystals	lb.	.22½@.23
Oxide	"	.45
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09¼
Carbonate, ppt.	"	.09
Chloride solution, com'l	"	.02¼
Chloride granular	"	.04¼@.04⅝
Dust	"	.04⅝@.04½
Sulphate	"	.02½@.02⅝

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.35
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07⅛@.08¼
THORIUM—Nitrate 49@50%.	"	4.50
URANIUM—Nitrate	oz.	.25
YTTRIUM—Nitrate	lb.	40.00
ZIRCONIUM—Nitrate	"	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.